APPENDIX C:

Copy of U.S. Army Corps of Engineers Permit Application

WALPOLE-CHARLESTOWN
X-A000(487) - 14747

NH ROUTE 12

U.S. ARMY CORPS OF ENGINEERS
INDIVIDUAL SECTION 404 PERMIT APPLICATION




MAY 2017

Prepared for:

New Hampshire Department of Transportation
7 Hazen Drive
Concord, NH 03302-0483

Prepared by:

Comprehensive Environmental Inc
21 Depot Street
Merrimack, NH 03054

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U.S. ARMY CORPS OF ENGINEERS

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 30-SEPTEMBER-2015

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PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Donald Middle - Last - Lyford	First - Clint Middle - Last - Mercer
Company - NH Department of Transportation	Company - Jacobs Engineering Group
E-mail Address - Donald.Lyford@dot.nh.gov	E-mail Address - Clinton.Mercer@jacobs.com
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address- 7 Hazen Drive	Address- Two Executive Park Drive
City - Concord State - NH Zip - 03302 Country - US	City - Bedford State - NH Zip - 03110 Country - US
7. APPLICANT'S PHONE NOs. w/AREA CODE	10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax
603-271-2165	603-666-7181

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

_____ _____
SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Walpole-Charlestown X-A000(487), 14747

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
Connecticut River, Jabes Meadow Brook	Address 117 Church St.
15. LOCATION OF PROJECT Latitude: ◦N 43.150960 Longitude: ◦W -72.449566	City - North Walpole State- NH Zip- 03609

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID Municipality
Section - Township - Range -

17. DIRECTIONS TO THE SITE

From Manchester, NH take NH Route 101 West for approximately 67 miles to the intersection with NH Route 10/12 North and continue of NH 12 for approximately 23.3 miles to 117 Church Street (NH Route 12). The project extends approximately 2.75 miles to the intersection of NH Route 12 and NH Route 12A.

18. Nature of Activity (Description of project, include all features)

The project proposes to reconstruction approximately 2.8 miles (14,500 ft) of NH 12 between the towns of Walpole and Charlestown, NH. It involves widening, shifting and updating NH 12 to accommodate two 11-foot travel lanes and two paved 4-foot to 5-foot shoulders. In order to accommodate the widening without impacting daily train traffic on the railroad lines located immediately to the east of NH 12, the existing unstable slopes to the Connecticut River will be reconstructed and extended into the river to the west. Existing cross culverts and drainage which carry flows from east of the railroad and from the area between the railroad and the existing roadway will be extended to the face of the new slope. There will be water quality treatment consisting of infiltration trenches at the edge of both sides of the pavement connecting to underlying stone reservoir cells below the structural road "box" of NH 12.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The purpose of and need for the project is to improve the conveyance of traffic and to address safety concerns. The current roadway is narrow and contains little to no shoulders. Over the past decade there have been multiple accidents along this section of roadway, several of which are indicative of the safety concerns associated with a lack of adequate shoulders, updated guardrail and appropriate safety zones between both the Connecticut River and the railroad facility. Several sections of the roadway embankments are showing signs of deterioration and in some locations have begun sloughing into the Connecticut River.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Embankment fill will be placed in the Connecticut River located near the existing roadway to allow for the proposed roadway widening. Due to the proximity of the river to the roadway, widening cannot be accomplished without impacts to the river.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
28,000 CY embankment fill		

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres 3.97 acres permanent impact

or

Linear Feet 4,880 linear feet of impact to USACE riverine wetlands

23. Description of Avoidance, Minimization, and Compensation (see instructions)

Impacts to wetlands/open waters were minimized through design of steep side slopes, vegetated slope stabilization and minimal widths for roadway travel lanes. Compensation will be achieved through a combination of self mitigating vegetated slope stabilization and payment to the Aquatic Resource Mitigation (ARM) Fund Program.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- See attached list of abutters.

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
NHDES	Wetland Permit	TBD	May 2017		
NHDES	Shorelands Permit	TBD	June 2017		
NHDES	401 WQC	TBD	June 2017		
USEPA	NPDES	TBD	TBD		

* Would include but is not restricted to zoning, building, and flood plain permits

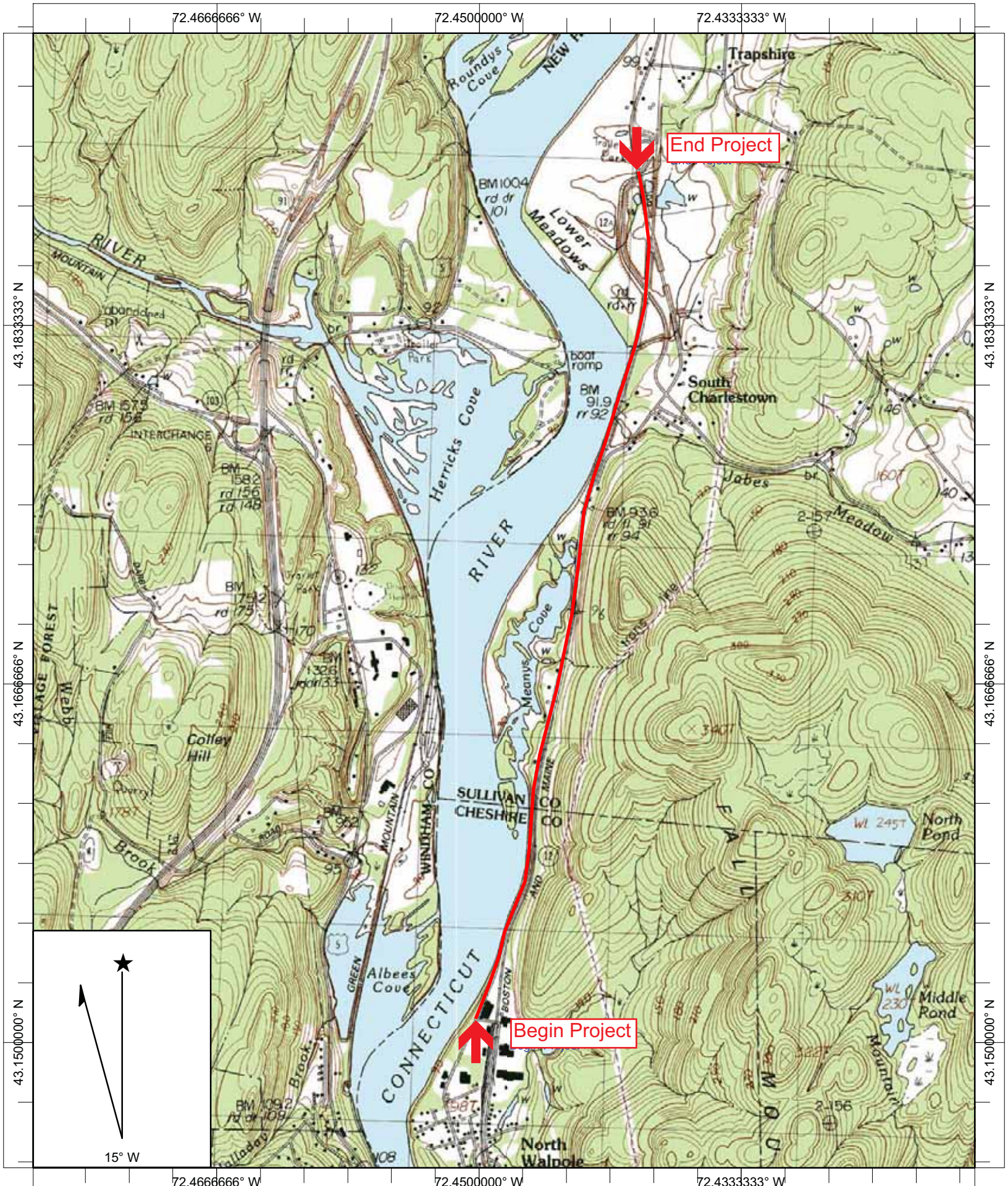
27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

USGS Location Map



Name: BELLOWS FALLS
Date: 2/14/2007
Scale: 1 inch equals 2000 feet

2,000 ft
1 in

Location: 043.1705589° N 072.4484471° W
Caption: Walpole-Charlestown, 14747, X-A000(487)

List of Abutters

Parcel#	Parcel Size	Parcel Address	Party Type	Party Name	Party Address
001	0.70 ACRES	27/1-7 WALPOLE 140 CHURCH ST	OWNER	NICHOLAS A POSELLI	10 BANK DRIVE LN NO WALPOLE NH 03609 USA
002	2.5 ACRES	27/3 WALPOLE	OWNER	LAVALLEY BUILDING SUPPLY	40 MEADOW ACCESS LN WALPOLE NH 03608-4416 USA
003	3.4 ACRES	27/1-2 WALPOLE	OWNER	GREAT RIVER HYDRO LLC	9 CAPITOL ST CONCORD NH 03301 USA
004	2.3 ACRES	27/4 WALPOLE 155 CHURCH ST	OWNER	LEN TEX CORP	ROUTE 12 NO WALPOLE NH 03609 USA
004-1		27/ WALPOLE	OWNER	BOSTON AND MAINE CORPORATION	44 INDUSTRIAL PARK DRIVE DOVER NH 03820 USA
005	22.3 ACRES	27/12 WALPOLE	OWNER	STATE OF NEW HAMPSHIRE	DEPARTMENT OF TRANSPORTATION CONCORD NH 03302-0483 USA
006	5.5 ACRES	27/7 WALPOLE 18 LENTEX LN	OWNER	DCR REAL ESTATE LLC	50 WASHINGTON ST KEENE NH 03431 USA
007	147 ACRES	27/8 WALPOLE	OWNER	ROLAND E SCOTT	300 SUMMIT RD KEENE NH 03431 USA
007	147 ACRES	27/8 WALPOLE	OWNER	STANTON N SCOTT	300 SUMMIT RD KEENE NH 03431 USA
007	147 ACRES	27/8 WALPOLE	OWNER	SHELDON P SCOTT	300 SUMMIT RD KEENE NH 03431 USA
008	123 ACRES	27/5 WALPOLE	OWNER	H&H INVESTMENTS LLC	499 CAMPBELL HILL RD FRANCESTOWN NH 03043 USA
010	54.00 ACRES	259/7 CHARLESTOWN	OWNER	GREAT RIVER HYDRO LLC	9 CAPITOL ST CONCORD NH 03301 USA
012	943 ACRES	261/1 CHARLESTOWN BELLOWS FALLS RD	OWNER	STATE OF NH	PO BOX 1856 CONCORD NH 03302 1856
013	327 ACRES	258/22 CHARLESTOWN LANGDON RD	OWNER	H&H INVESTMENTS LLC	499 CAMPBELL HILL RD FRANCESTOWN NH 03043 USA
014	0.98 ACRES	260/2 CHARLESTOWN BELLOWS FALLS RD	OWNER	MICHAEL L SPIGAROLO	PO BOX 162 CHARLESTOWN NH 03603 USA
015	1.11 ACRES	260/3 CHARLESTOWN 2496 BELLOWS FALLS RD	OWNER	DONALD TACY	PO BOX 607 CHARLESTOWN NH 03603 USA
015	1.11 ACRES	260/3 CHARLESTOWN 2496 BELLOWS FALLS RD	OWNER	JUDY A TACY	PO BOX 607 CHARLESTOWN NH 03603 USA
015	1.11 ACRES	260/3 CHARLESTOWN 2496 BELLOWS FALLS RD	OWNER	JENNI DRUSENDAHL	PO BOX 573 CHARLESTOWN NH 03603 USA
015	1.11 ACRES	260/3 CHARLESTOWN 2496 BELLOWS FALLS RD	OWNER	DOMINIC SALADYGA	PO BOX 573 CHARLESTOWN NH 03603 USA
016	1.23 ACRES	260/4 CHARLESTOWN BELLOWS FALLS RD	OWNER	JUDY A TACY	PO BOX 607 CHARLESTOWN NH 03603 USA
016	1.23 ACRES	260/4 CHARLESTOWN BELLOWS FALLS RD	OWNER	DONALD TACY	PO BOX 607 CHARLESTOWN NH 03603 USA
017	2.3 ACRES	260/5 CHARLESTOWN BELLOWS FALLS RD	OWNER	DEBORAH S KONESKO GILBERT	PO BOX 1245 CHARLESTOWN NH 03603 USA
017	2.3 ACRES	260/5 CHARLESTOWN BELLOWS FALLS RD	OWNER	JUDITH E KONESKO	PO BOX 1245 CHARLESTOWN NH 03603 USA
018	0.31 ACRES	259/6 CHARLESTOWN BELLOWS FALLS RD	OWNER	NEW ENGLAND CENTRAL RAILROAD INC	9 CAPITOL STREET CONCORD NH 03301 USA
019	1.2 ACRES	259/3 CHARLESTOWN 191 OLD STATE RD	OWNER	FREDERICK POISSON	PO BOX 1499 CHARLESTOWN NH 03603 USA
019	1.2 ACRES	259/3 CHARLESTOWN 191 OLD STATE RD	OWNER	VIRGINIA POISSON	PO BOX 1499 CHARLESTOWN NH 03603 USA
020	0.37 ACRES	259/4 CHARLESTOWN BELLOWS FALLS RD	OWNER	NEW ENGLAND CENTRAL RAILROAD INC	9 CAPITOL STREET CONCORD NH 03301 USA
021	3 ACRES	259/2 CHARLESTOWN 125 OLD STATE RD	OWNER	DARLENE BONIFACE	125 OLD STATE RD CHARLESTOWN NH 03603 USA
022	0.88 ACRES	259/1 CHARLESTOWN 121 OLD STATE RD	OWNER	JEAROLD L WILCOX	121 OLD STATE RD CHARLESTOWN NH 03603 USA
023	2.8 ACRES	254/2 CHARLESTOWN BELLOWS FALLS RD	OWNER	GREAT RIVER HYDRO LLC	9 CAPITOL ST CONCORD NH 03301 USA
024	1.8 ACRES	255/55 CHARLESTOWN 66 OLD STATE RD	OWNER	THE GOLDEN KNIGHT LTD	26 SQUARE BELLOWS FALLS VT 05101 USA
025	1.8 ACRES	255/57 CHARLESTOWN 59 OLD FERRY RD	OWNER	STATE OF NH, PURCHASED AS PART OF THE 14747 CONTRACT	
025	1.8 ACRES	255/57 CHARLESTOWN 59 OLD FERRY RD	OWNER	STATE OF NH, PURCHASED AS PART OF THE 14747 CONTRACT	
025	1.8 ACRES	255/57 CHARLESTOWN 59 OLD FERRY RD	OWNER	STATE OF NH, PURCHASED AS PART OF THE 14747 CONTRACT	
025	1.8 ACRES	255/57 CHARLESTOWN 59 OLD FERRY RD	OWNER	STATE OF NH, PURCHASED AS PART OF THE 14747 CONTRACT	
026	0.91 ACRES	255/56 CHARLESTOWN OLD STATE RD	OWNER	STATE OF NEW HAMPSHIRE	PO BOX 483 CONCORD NH 03302 0483 USA
027	0.39 ACRES	/ CHARLESTOWN OLD FERRY RD	OWNER	STATE OF NEW HAMPSHIRE	PO BOX 483 CONCORD NH 03302 0483 USA
028	0.59 ACRES	255/59 CHARLESTOWN 24 OLD FERRY RD	OWNER	JACQUELINE E NOBREGA	24 OLD FERRY RD CHARLESTOWN NH 03603 USA
029	3.4 ACRES	255/58 CHARLESTOWN LANGDON RD	OWNER	NEW ENGLAND CENTRAL RAILROAD INC	9 CAPITOL STREET CONCORD NH 03301 USA
030	2.7 ACRES	255/61 CHARLESTOWN	OWNER	STATE OF NH	7 HAZEN DR CONCORD NH 03302-0483 USA
031	97 ACRES	254/1 CHARLESTOWN CONNECTICUT RIVER	OWNER	GREAT RIVER HYDRO LLC	9 CAPITOL ST CONCORD NH 03301 USA
033	2.4 ACRES	255/3 CHARLESTOWN OLD STATE RD	OWNER	STATE OF NEW HAMPSHIRE-DOT	PO BOX 483 CONCORD NH 03302 0483 USA
034	7.5 ACRES	255/1 CHARLESTOWN LANGDON RD	OWNER	GREAT RIVER HYDRO LLC	9 CAPITOL ST CONCORD NH 03301 USA
035	47 ACRES	252/29 CHARLESTOWN	OWNER	EVELYN SNOW	956 N HEMLOCK RD CHARLESTOWN NH 03603 USA
035	47 ACRES	252/29 CHARLESTOWN	OWNER	ERNEST L CHAMBERLAIN	PO BOX 114 CHARLESTOWN NH 03603 USA
035	47 ACRES	252/29 CHARLESTOWN	OWNER	MARY CHAMBERLAIN	956 N HEMLOCK RD CHARLESTOWN NH 03603 USA
036	7.1 ACRES	252/28 CHARLESTOWN	OWNER	WILD GOOSE CHASE PROPERTIES LLC	90 MAPLE ST WEST LEBANON NH 03784 USA
037	36.60 ACRES	255/6 CHARLESTOWN WETHERBY RD	OWNER	PUTNAM FARMS INC	39 OLD CHESHIRE TPKE CHARLESTOWN NH 03603 USA
MIT001	2.0 ACRES	1/1401.0 LANGDON NORTH POND	OWNER	SUSAN GLAZIER REVOCABLE TRUST	9616 CALLAWAY CT DENTON TX 76207 USA

Permit Narrative

Waterways and Wetland Fill Application Narrative

1.0 Existing Conditions

The existing roadway is located in proximity to the Connecticut River to the west, and an active railroad to the east. Immediately to the east of the existing railroad line is a very steep hillside leading up to Fall Mountain. The project area is located just to the north of the North Walpole Village and several miles south of the Charlestown Village. The Villages of North Walpole and Charlestown are typical of many small New Hampshire towns with small, moderately dense residential / business districts surrounded by forestlands, agricultural lands and rural/residential properties. The southern end of the project area abuts the northern outskirts of the North Walpole Village adjacent to several commercial properties. The areas adjacent to the middle and northern segments contain a mix of residential, forested/natural and agricultural properties.

The existing roadway contains two 11-foot to 12-foot lanes with no shoulders. The lack of roadway shoulders forces bicyclists and pedestrians to travel within the vehicle lanes and do not provide for safe emergency stopping and vehicle recovery. The safety concerns associated with vehicle recovery are further exacerbated by substandard cable guardrail and the proximity of the roadway to the railroad facility to the east and the steep embankments of the Connecticut River to the west of the existing roadway.

Over the past decade there have been multiple accidents along this section of roadway, several of which are of particular importance as they are indicative of the safety concerns associated with a lack of adequate shoulders, updated guardrail and appropriate safety zones between both the Connecticut River and the railroad facility. Two of these accidents, one of which resulted in a fatality, involved vehicles crashing through the guardrail and sliding down the steep embankment into the Connecticut River. Another two accidents involved vehicles crashing through the guardrail and coming to rest on the railroad tracks where they were subsequently hit a train before they could be removed from the tracks. Another accident, which resulted in a fatality, involved a vehicle crossing the centerline and hitting an oncoming vehicle.

In addition to the above noted safety concerns, the roadway is showing signs of substantial deterioration. Several locations along the roadway embankments adjacent to the Connecticut River, mainly near the southern end of the project, are showing signs of instability and in some locations have begun sloughing into the River. The existing bank along these sections of the river are in varying degrees of disturbance due to erosion and the aforementioned sloughing as well as lack of vegetation. Many of the existing drainage structures including culverts, catch basins and headwalls are no longer functioning properly or are also showing signs of substantial deterioration.

The intent of this project is to address the above noted safety concerns and structural deficiencies by widening, reconstructing and updating NH Route 12 within the project area.

2.0 Alternatives Overview

During the Context Sensitive Solutions (CSS) process utilized for this project, the Project Advisory Committee (PAC) developed several alternatives which were subsequently evaluated on their ability to meet the project's purpose and need as well as the projects vision statement. It was determined early on during the process that in order to address the existing safety deficiencies of NH Route 12, the proposed project should include the construction of an updated facility which includes the addition of paved shoulders. The American Association of State Highway and Transportation Officials (AASHTO) recommends that a facility similar to NH Route 12 should be constructed with 12-foot travel lanes and 8-foot shoulders. The Department, at the recommendation of the PAC, and in consultation with the FHWA has determined that despite the AASHTO recommendations, a facility with 11-foot travel lanes and 4-foot to 5-foot shoulders will adequately meet the project's purpose and need while minimizing impacts to the surrounding properties and the natural, cultural and socioeconomic environments as well as reducing the overall project costs.

A more detailed alternative analysis of the options considered by the Department and the PAC can be found in the Categorical Exclusion document. In addition to the CSS process, this project and the alternatives were reviewed in Natural Resource Agency Meetings at the NHDOT with agency representatives including USACE between 2007 and 2017.

3.0 Description of Proposed Action

This project involves the reconstruction of approximately 2.8 miles (14,500 ft) of NH 12 between the towns of Walpole and Charlestown, NH. The roadway is located in proximity to the Connecticut River and an active railroad line (referred to as the New England Central Railroad or the Sullivan County Railroad). The current roadway is narrow and contains little to no shoulders. Several sections of the roadway embankments are showing signs of deterioration and in some locations have begun sloughing into the Connecticut River. This project involves widening, shifting and updating NH 12 to accommodate for two 11-foot travel lanes and two paved 4-foot to 5-foot shoulders. The project begins at the NH 12/Main Street intersection in North Walpole and proceeds north approximately 2.8 miles to the intersection of NH 12 and 12A.

Through the CSS process, the PAC assisted in developing the project purpose and need, identifying numerous alternatives and recommending a proposed action. The proposed action is described in more detail below in three distinct project sections, a southern segment, the Meany's Cove (middle) segment and a northern segment.

Southern Segment

The southern segment begins near just north of the Main Street and Church Street intersection in North Walpole, NH and continues approximately 4400' (STA 2003-2047) north on NH 12. Proposed work includes widening the road to accommodate two 11-foot travel lanes and two paved 4-foot to 5-foot shoulders by constructing a permanent armored slope that varies from 1.5H to 2H:1V (horizontal to vertical) with vegetation into the Connecticut River, with the toe of slope extending up to 75-feet horizontally beyond the existing ordinary high water mark (OHW). The upper portion of the reconstructed

bank slope will be covered with 6" of humus and native plantings. A formal planting plan will be prepared for this area. The slope height sometimes exceeds 50' above the water through this segment and the slope has been designed flat enough to allow the Contractor to construct the lower part of the slope from a temporary haul road or bench constructed within the upper limits of the proposed stone/slope work (above OHW). Road work will consist of phased full depth construction of a new road subbase (structural box) and surface pavement. Existing cross culverts and drainage which carry flows from east of the railroad and from the area between the railroad and the existing roadway will be extended to the face of the new slope. The cross culverts through this segment were previously analyzed and determined to not be subject to NH stream crossing rules due to lack of stream thread and/or flow east of the railroad or due to lack of stream thread or connectivity to the Connecticut River to the west of NH 12. There will be water quality treatment in this segment consisting of infiltration trenches at the edge of both sides of the pavement connecting to underlying stone reservoir cells below the structural road "box" of NH 12.

Middle Segment

The middle segment is approximately 4500' long (STA 2047-2092). Proposed work includes widening the road to accommodate two 11-foot travel lanes and two paved 4-foot to 5-foot shoulders by constructing a permanent 1.5H:1V (horizontal to vertical) armored slope with surface vegetation into the both localized wetland areas and portions of Meany's Cove. The upper portion of the reconstructed bank slope will be covered with 6" of humus and native plantings. A formal planting plan will be prepared for this area. In wetland areas within this segment, the height of slope is much smaller so it is possible to construct the slope work from the existing top of slope. Road work will consist of phased full depth construction of a new road subbase (structural box) and surface pavement. Existing cross culverts and drainage which carry flows from east of the railroad and from the area between the railroad and the existing roadway will be extended. Two cross culverts within this segment were previously analyzed and determined to not be subject to NH stream crossing rules due to lack of stream thread and/or flow east of the railroad or due to lack of stream thread or connectivity to the Connecticut River to the west of NH 12. There will be water quality treatment in this segment consisting of infiltration trenches at the edge of both sides of the pavement connecting to underlying stone reservoir cells below the structural road "box" of NH 12.

Northern Segment

The northern segment begins at the end of the Meany's Cove segment in Charlestown, NH and continues approximately 5600' (STA 2092-2148) north on NH 12 to the intersection of NH 12A. Proposed work includes widening the road to accommodate two 11-foot travel lanes and two paved 4-foot to 5-foot shoulders by constructing a permanent 1.5H:1V (horizontal to vertical) armored slope with surface vegetation into the Connecticut River, with the toe of slope extending up to nearly 30-feet beyond the existing ordinary high water mark (OHW). The upper portion of the reconstructed bank slope will be covered with 6" of humus and native plantings. A formal planting plan will be prepared for this area. The slope height sometimes exceeds 20' above the water through this segment and the slope has been designed flat enough to allow the Contractor to construct the lower part of the slope from a temporary haul road or bench constructed within the upper limits of the proposed stone/slope work (above OHW). There are also impacts to localized wetlands through this segment. Road work will consist of phased full depth construction of a new road subbase (structural box) and surface pavement.

The cross culverts through this segment were previously analyzed and the crossing at STA 2121+27 (referred to in the attached documentation as STA 3121+40 or Crossing #9) was determined to be subject to NH stream crossing rules (*Appendix E*). Since the railroad portion of the crossing cannot be impacted at all due to the daily train traffic (2 Amtrak and up to 6 freight trains), improvements will include extension on the eastern end, inlet/outlet improvements and associated temporary water diversion/clean water bypass features. The crossing at STA 2105+68 (referred to in the attached documentation as STA 3105+75 or Crossing #8) was determined to not be subject to NH stream crossing rules due to the termination of the stream thread to the east of the crossing (the culvert acts as an equalization culvert between the ponded area at the termination of Jabes Meadow Brook to the east of the road/rail embankment and the Connecticut River to the west). There will be water quality treatment in this segment consisting of infiltration trenches at the edge of both sides of the pavement connecting to underlying stone reservoir cells below the structural road "box" of NH 12.

Impacts to the Southern Segment will include disturbances to bank and perennial stream (R2UB3) associated with the Connecticut River. Additional temporary impacts will be present approximately 10-feet beyond the toe of slope to allow for temporary construction activities per NHDOT construction standards. Impacts to the Middle Segment are also largely associated with construction of the 1.5H:1V vegetated riprap slope into both localized wetland areas (PF01E, PSS/PF01E, PSS1E) and Meany's Cove (POW). Additional minor permanent impacts are associated with drainage improvements near an intermittent stream (R4SB3). Temporary impacts are also present throughout to allow for clearing and construction access within temporary and permanent easements. Impacts to the Northern Segment are similar in nature to the southern third of the project, as a permanent 1.5H:1V armored slope with surface vegetation will extend into the Connecticut River and will involve disturbances to bank and perennial stream (R2UB3). Additional permanent impacts will include localized disturbances to wetland areas (PEM1E, PF01E, POW). Additional temporary impacts will be present approximately 10-feet beyond the toe of slope to allow for temporary construction activities per NHDOT construction standards and within temporary and permanent easements to allow for clearing and construction access.

Least Intrusive Method

The NH 12 proposed improvements propose stone fill on the banks of the Connecticut River. The riverbank stabilization treatment proposed is a 1.5 H to 2.0 H:1V armored slope with surface vegetation. Below the OHW mark stone will be placed to provide bank stabilization. Starting 2' above OHW 6" of humus will be placed over the class B stone up to the top of bank. Native bank plantings will be utilized in this area. Other alternatives considered included relocating the existing railroad and NH 12 to the east, however this option would double construction costs and is not feasible within the Department's program. Steeper slopes to limit impacts were considered however a steeper slope cannot be safely constructed due to the height of the slope. Cast-in-place retaining walls were also considered however the increased construction cost is not feasible within the program, there is still the potential failure of the existing 1:1 slope below the wall, the potential for vandalism/graffiti is higher, the wall would act as a wildlife barrier, the service life of the wall is lower, maintenance requirements are higher and the wall would be less aesthetically pleasing than the vegetated slope. For these reasons the cast-in-place retaining wall was considered more intrusive. The vegetated bank detail has been utilized successfully on other projects including NH 63 in Chesterfield at Spofford Lake.

4.0 Wetlands and Resource Areas

Wetlands

Work associated with this project involves dredge and fill activities within the jurisdiction of the Army Corps of Engineers (USACE). Impacts consist of 172,801 square feet (3.97 acres) of permanent impacts to USACE jurisdictional wetlands and 4,880 linear feet of permanent bank or channel impacts. In addition, there are 101,536 square feet (2.33 acres) of temporary impacts associated mostly with the area between the permanent wetland impact limit and the proposed erosion control/limit. The type of wetland and impact associated with that wetland are detailed in the table included on Sheet 2 of the Wetland Plans in *Appendix H*. Wetland functional assessments are included in *Appendix A*. Color photos detailing existing conditions and impacted wetlands are provided in *Appendix F*.

The project was reviewed by the USACE, NHDES, NH Fish and Game (NHF&G), US Environmental Protection Agency (EPA), the Federal Highway Administration (FHWA) and several other agencies/organizations at the April 18, 2007, May 20, 2009, August 20, 2008, October 29, 2009, June 16, 2010, January 20, 2016, March 15, 2016, February 15, 2017 and April 19, 2017 Natural Resource Agency coordination meetings (see *Appendix G*). None of the agencies or organizations represented at these meetings objected to the proposed action as long as a mutually agreed mitigation package is provided for the proposed wetland impacts.

Surface Waters/ NH Designated Rivers/ Water Quality Treatment

The Rivers Management & Protection Act (RMPA) (NH RSA 483) provides additional protection for Rivers within the State of NH that have been determined to be outstanding natural and cultural resources by the Legislature and the Governor of the State of New Hampshire. This act also established the creation of the NHDES Rivers Management & Protection Program (RMPP) and allows for the creation of local advisory committees to oversee the protection of the State's protected (designated) rivers. The Connecticut River is a designated river, managed by the Connecticut River Joint Commissions (CRJC). The CRJC is a non-profit organization which is comprised of two commissions and five sub-committees which work together to coordinate river protection efforts between the states of Vermont and New Hampshire. The former Director of the CRJC sat on the PAC for the proposed project and was intricately involved in the proposed design. The CRJC has indicated that it is in support of the proposed action.

The Clean Water Act (CWA) of 1972 (33 U.S.C. 1251) regulates the discharge of pollutants into the waters of the United States and sets quality standards for surface waters. In accordance with the CWA, the surface waters of New Hampshire have been classified by the state legislature (RSA 485-A:8) as either Class A or Class B. Class A waters are considered to be of the highest quality and considered optimal for use as water supplies after adequate treatment. Class B waters are considered to be of slightly less quality than those designated Class A, however they are still considered adequate for wildlife habitat and recreational activity. The Connecticut River within the project area has been designated a Class B Water. Infiltration BMPs are proposed in the form of shoulder infiltration trenches connected to stone reservoir cells located beneath the subbase soils of the proposed NH 12 road bed. The increase in impervious area project wide is approximately 2.3 acres and the proposed BMPs provide treatment for approximately 7.3 acres of impervious surface.

Infiltration trenches are proposed to be installed on either side of the roadway adjacent to the paved shoulders. Stormwater runoff will enter the BMP via these infiltration trenches. An 18" deep stone reservoir that contains water quality volume (WQV) cells will be constructed below the structural gravel subbase of the proposed roadway and will be connected to the stone infiltration threnches outside the shoulders. Transverse overflow underdrains will be installed above the WQV elevation to protect the roadbed. These underdrains will be connected to existing or proposed drainage outlets or if not located within the vicinity of the drainage will have their own outlet.

Several types of BMPs were originally considered but poor permeability of existing soils, the presence of a high groundwater tables in some open locations, impacts to trees near the Connecticut River and steep terrain between the roadway and river limited the options. BMPs considered in lieu or addition to the proposed BMP included:

- Open graded friction course (OGFC) – After some investigation this was discarded as a potential BMP because the Department's Pavement Section had reservations about using it on the travel way (longevity issues) and it cannot be counted as a BMP if it is only used on the shoulders;

- Porous pavement shoulders – The Department's Construction Section had strong reservations about using this BMP because the pavement would have to be placed using hand method due to the proposed 5 foot wide shoulders and would have been extremely expensive for a 3 mile project. In addition, long-term maintenance issues and associated costs area a concern;

- A wet extended basin located in the field on the north end of Meany's Cove – A BMP to treat 4.8 acres of pavement (2 x the area of new pavement) is feasible however it is not possible to drain 4.8 acres of pavement to this location due to profile and grades.

In accordance with section 303(d) of the CWA, NHDES has designated the subject section of the Connecticut River as an impaired water for mercury levels. As roadway runoff does not generally contain mercury levels beyond those contained within normal precipitation in the State, the proposed project is not expected to further impair the subject section of the Connecticut River.

To minimize the potential for erosion and sedimentation increases in the Connecticut River and other downstream wetland systems during construction, the contractor responsible for the work will be required, as a contract provision, to prepare a Stormwater Pollution Prevention Plan detailing the pollution prevention measures which will be employed prior to the commencement of construction activities.

Floodplains/ Floodways

Walpole and Charlestown are communities that participate in the National Flood Insurance Program (both towns are listed as Community Number 330153). The project lies within areas delineated as Floodway Areas, Special Flood Hazard Areas, and Zone X on the Flood Insurance Rate Map. The Floodway Area is defined by the Federal Emergency Management Agency (FEMA) as "the channel of the river plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-

year flood can be carried without substantial increases in flood heights." Special Flood Hazard Areas are subject to inundation by the 100-year flood. Zone X areas are those areas that are subject to the 500-year flood or areas that are subject to the 100-year flood but with average depths of less than one foot. Floodway impacts have been assessed through HEC-RAS modeling and a Conditional Letter of Map Revision (CLOMR) will be prepared along with a Letter of Map Revision (LOMR) following construction.

5.0 Mitigation Evaluation and Computation

The proposed project involves impacts to the banks of the Connecticut River and wetland resource areas totaling more than 10,000 square feet, therefore the project qualifies as a major impact. Major impacts by rule require compensatory mitigation. The wetland impacts that are proposed for the project are permanent impacts and in accordance with Env-Wt 302.03 (b) and Env-Wt 302.03(c)(2)c, mitigation is proposed for 25,122 square feet of wetland impacts and 4,880 linear feet of channel/bank impacts, which will be met by paying $1,287,621.45 to the Aquatic Resource Mitigation (ARM) Fund. Note that stream locations with both an area and linear footage impact are paid using the ARM stream payment calculator (e.g., based on linear footage only) thus, the wetland impact included in the fee calculations was reduced by 147,677 square feet, from 172,799 square feet to 25,122 square feet, with the remainder covered by the stream impact fee. During discussions with the agencies at Natural Resource Agency meetings, it was agreed that the bio-engineering solution proposed for the upper portion of the slope detail (above OHW) consisting of 6" of humus placed over the stone and planted with native vegetation would be self-mitigating thus the above noted bank impact was reduced by 5,203 linear feet, from 10,083 linear feet to 4,880 linear feet. A formal planting plan will be provided for the vegetated portion of the proposed slope stabilization. Please see *Appendix B* for the mitigation proposal and ARM calculations.

6.0 Stream Crossing Rules & Evaluations

Nine stream/drainage crossings were evaluated in the field to determine the applicability of NH's Stream Crossings Rules (Env-Wt 901). Based on this evaluation, it was determined that only one stream crossing located at STA 2121+27 (referred to in the attached documentation as STA 3121+40 or Crossing #9), was subject to the Stream Crossings Rules as a Tier 3 Crossing. Seven crossings to the south were found to represent drainage ditches or swales with no connectivity to the Connecticut River and the culvert at STA 2105+68 (referred to in the attached documentation as STA 3105+75 or Crossing #8) was found to act as an equalization culvert, thus is not subject to the Stream Crossings Rules. Due to the restrictions created by the rail road prohibiting replacement of the culvert at STA 2121+27 the culvert end to the west will be extended in kind. (See *Appendix D & E*)

7.0 Construction Sequencing

The proposed project will occur in multiple phases. Construction is expected to take approximately two years. The following is the estimated construction sequence.

Large Culvert Construction

STA. 2105+68 Reconstruct the 6.5’ x 5.5’ concrete box culvert under NH 12 and match into the 6.5’ x 13’ open bottom granite box under the railroad.

Phase 1:

- Construct water diversion structures at inlet and outlet.
- Construct cofferdam for dewatering from outlet to proposed construction baseline.
- Utilize one lane, alternating two way traffic on east side of existing NH 12.
- Construct headwall and west side of box culvert.
- Pump water from east side to west side through existing/proposed culvert and water diversion structures as needed.

Phase 2:

- Shift traffic to west side of NH 12 over proposed box culvert constructed in Phase 1. Utilize one lane, alternating two way traffic.
- Construct cofferdam for dewatering from proposed construction baseline to end of 6.5’ x 13’ open bottom granite box between railroad and NH 12.
- Construct remaining box culvert precast segments and complete closure pour between open granite box and precast section.
- Pump water from east side to west side through existing/proposed culvert as needed.

STA. 2121+27 Reconstruct 66” RCP under NH 12 and match into existing 66” RCP under railroad.

Phase 1:

- Construct water diversion structures at inlet and outlet.
- Construct cofferdam for dewatering from outlet to proposed construction baseline.
- Utilize one lane, alternating two way traffic on east side of existing NH 12.
- Construct headwall and west side of 66” RCP.
- Pump water from east side to west side through existing/proposed culvert and water diversion structures as needed.

Phase 2:

- Shift traffic to west side of NH 12 constructed in Phase 1. Utilize one lane, alternating two way traffic.
- Construct cofferdam for dewatering from proposed construction baseline to limit of 66” RCP replacement between NH 12 and railroad.

- Construct remaining 66" RCP.
- Pump water from east side to west side through existing/proposed culvert as needed.

Construction Phasing

- Construct stone slope in Connecticut River behind existing guardrail. Temporary work zone for one lane, alternating two way traffic using flaggers as needed for construction access to slope.
- Set up short work zone for one lane, alternating two way traffic using temporary signal. Length of work zone to be determined.
- Construct Phase 1B, Phase 1C and Phase 2 before moving work zone.
- Continue completion of full width to binder grade for each work zone prior to moving.
- Phase 1A – Construct armored slope in river. Extend existing drainage to new slope.
- Phase 1B - Construct temporary widening to the west or the east side of existing NH 12 at existing grade.
- Phase 1C – Shift traffic to the west or the east on temporary and existing grade, construct east/west side to proposed construction baseline to proposed binder grade.
- Phase 2 – Complete full width construction on east/west side to proposed binder grade.
- Phase 3 – Final paving and pavement markings using temporary lane closures after complete length of project is up to binder grade.

Phase 1A

- Construct temporary erosion control measures including turbidity barrier in Connecticut River.
- Clearing and grubbing utilizing one lane, alternating two way traffic with flaggers as necessary.
- Close scenic overlook/wide shoulder at STA. 2024+00, LT. and place temporary barrier at existing edge of pavement.
- Maintain two lane - two way traffic operations of existing NH 12 during non-work hours.
- Construct 1.5:1 to 2:1 armored slopes with surface vegetation from STA. 2012+25 to STA. 2041+25, LT.
- Extend existing drainage outlets to remain, to the proposed armored slope. Detain water at inlet using existing ditch to drain or pump to next existing structure. Limit work to extending one outlet at a time to provide clean water bypass to nearest existing structure.
- Relocate utility poles prior to Phase 1B construction.

Phase 1B

- Construct temporary erosion control measures.
- Construct proposed drainage under NH 12. Detain water at inlet using existing ditch to drain or pump to next existing structure. Complete proposed crossing before removing existing drainage used as clean water bypass.
- Construct temporary widening.
- Maintain short lengths of one lane, alternating two way traffic during construction.
- Traffic may travel on crushed stone (fine or course gradation) on a short term basis.
- Construct east/west side of proposed NH 12.
- Construct temporary pavement markings along NH 12 in preparation for Phase 1C traffic operations.
- Maintain access to all drives during construction.
- All open excavations to be protected or a traversable slope constructed during non-construction hours.

Phase 1C

- Construct temporary erosion control measures.
- Shift traffic to existing and temporary widening constructed in Phase 1B.
- Construct infiltration treatment trench to proposed construction baseline.
- Complete construction of east/west side of proposed NH 12 to binder grade.
- Maintain short lengths of one lane, alternating two way traffic during construction.
- Traffic may travel on crushed stone (fine or course gradation) on a short term basis.
- Maintain access to all drives during construction.
- All open excavations to be protected or a traversable slope constructed during non-construction hours.
- Place binder course pavement.

Phase 2

- Construct temporary erosion control measures.
- Remove Phase 1C temporary pavement markings and construct temporary pavement markings along NH 12 in preparation for Phase 2 traffic operations.
- Shift traffic onto the proposed NH 12 alignment on binder grade.
- Traffic may travel on crushed stone (fine or course gradation) on a short term basis.
- Maintain short lengths of one lane, alternating two way traffic during construction.

- Construct proposed driveways along west side of NH 12. Maintain access to all drives during construction.
- All open excavations to be protected or a traversable slope constructed during non-construction hours.

Phase 3

- Place final wearing course pavement and permanent pavement markings.

8.0 Wildlife Reviews

Natural Heritage Bureau

The proposed action has been reviewed by the NH Fish and Game (NHF&G) and the NH Natural Heritage Bureau (NHNHB). The most recent NHNHB search (NHB File ID: NHB16-3895, dated 1/10/2017- *Appendix C*) indicates database results for the Dwarf Wedge Mussel (*Alasmidonta heterodon*), the grass-leaved mud-plantain (*Heteranthera dubia),* the Bald Eagle (*haliaeetus leucocephalus*) and the potential presence of an exemplary natural community, Circumneutral rocky ridge.

A previous NHNHB search (NHB File ID: NHB14-3112, dated 8/21/2014) also indicated the potential presence of long-leaved pondweed (*potamogeton nodosus*). This search also indicated the potential presence of two exemplary natural communities; Circumneutral rocky ridge and Rich Appalachian oak rocky woods. Coordination with the NHNHB at the October 29, 2009 Natural Resource Agency Coordination Meeting indicated that since the proposed action stays relatively close to the footprint of the existing roadway corridor and avoids extensive impacts to the slopes of Fall Mountain, the proposed action will not impact any of the rare plant species or exemplary natural communities which were identified within this NHB search.

In 2015 Stoney Ridge Environmental completed surveys of the proposed project area for terrestrial and aquatic vegetation. Surveys for suitable habitat and actual plants were performed for grass-leaved mud-plantain, long-leaved pond weed *(Potamogeton nodosus),* Fogg's goosefoot *(Chenopodium foggii),* four leaved milkweed *(Asclepias quardrifolia),* large-bracted tick-trefoil *(Desmodium cuspidatum),* upland thoroughwort *(Eupatorium sessilifolium)* and Virginia tickseed *(Hackelia virginiana)* (*Appendix C*). The areas surveyed for grass-leaved mud plantain included mud flat areas. The Department will analyze any design changes which impact suitable mud flat habitat not previously surveyed and consult on the need for additional survey within those new mud flat areas.

In July of 2016 a survey of the project area was conducted within the likely habitat for Dwarf Wedge Mussels within the Connecticut River. No live individuals or shells were found. The biologists have recommended that since no animals were found (which coincides with other surveys performed for the dam re-certification in the area) that no further surveys or activities are required. Wildlife review coordination is provided in *Appendix C*.

The Fall Mountain State Forest is known to contain a population of the federally endangered *Scirpus ancistrochaetus* (Northeastern Bulrush). Given the known existence of the Northeastern Bulrush in proximity to the proposed action, the NHNHB and the USF&WS requested that the project area be surveyed for its presence prior to the commencement of construction. The Department and the NHNHB conducted a review of the project area on September 1, 2010 and did not find any occurrences of the Northeastern Bulrush within those areas which would be impacted by the proposed project. In addition, during the Dwarf Wedge Mussel survey in July of 2016 the biologists surveyed the shoreline area and found none of the plants. During wetland delineations that same summer the wetlands checked were also surveyed with the wetland scientists finding none of the plants. Given the apparent absence of any federally listed species within the project's area of impact, the USF&WS indicated that no further consultation with their agency was necessary.

NHF&G has indicated that there are known populations of the Bald Eagle (*haliaeetus leucocephalus*) in the area surrounding the proposed project. The NHF&G had requested that the Department survey all 8-inch diameter or larger trees that will be removed to the east of the existing roadway. In August of 2014 the Department performed the survey (*Appendix C*). The figure shows the limits of work of the proposed project and indicates the location of the larger trees. Any such trees will be reviewed with NHF&G prior to removal. As requested by NHF&G any observations of bald eagles carrying sticks or other nesting materials on the NH side of the Connecticut River will be reported to them.

U.S. Fish and Wildlife Service

The proposed action has been reviewed by the USF&WS for the presence of federal or state, listed or proposed, threatened or endangered species, or other species of special or exemplary status. USF&WS IPaC results are in *Appendix C*. In a letter dated March 19, 2007, the USF&WS responded that based on currently available information, no species or habitats under the jurisdiction of the USF&WS were identified within the project area (*Appendix C*).

Other Wildlife

The Magnuson-Stevens Fishery Conservation and Management Act requires the federal government to identify Essential Fish Habitat (EFH) and make conservation recommendations to agencies whose actions could affect it. The project is located along the Connecticut River. The Connecticut River is an EFH for Atlantic Salmon (*Salmo salar*). An Essential Fish Habitat (EFH) Study was prepared (*Appendix C*) and was reviewed by the National Marine Fisheries Service (NMFS). Based upon the information provided in the Study, the NMFS has indicated that there are no concerns with the project as proposed and no further coordination is necessary.

The Walpole-Charlestown Survey Report found that there was probable presence of Northern Long Eared Bat (NLEB) reported from the acoustic analysis software. The potential calls (high frequency) were sent for qualitative analysis by Northern Stewards. Of the twenty-nine files reviewed they resulted in no visual confirmation. Therefore, in accordance with Step 7 of the USFWS Summer Survey Guidelines, no further surveys are needed. This can be considered a negative presence/absence (P/A) survey (*Appendix C*). Review of NH Fish and Game's list did not include hibernaculum or roost trees in Walpole or

Charlestown. In addition the NHNHB search did not indicate NLEB. Because the proposed work will not occur further than 300' from a rail/road the project qualifies for coverage under the FHWA Programmatic Consultation for NLEB. A Project Submittal Form will be submitted to the USFWS Field Office prior to project commencement.

Section 4(f) of the US Department of Transportation (US DOT) Act of 1966 (amended by 49 Section 303) provides protection for historic resources, wildlife refuges and publicly owned parks and recreational areas that are open to the public and are considered substantial recreational facilities. Consultation with the NH Division of the Federal Highway Administration has indicated that there are no wildlife refuge 4(f) resources within the project area.

Invasive Species

In accordance with the NH Invasive Species Act (ISA), (HB 1258-FN) The NH Department of Agriculture, Markets and Food (DAMF), Division of Plant Industry is responsible for the evaluation, publication and development of rules on invasive plant species. The purpose of this oversight is to protect the health of native species, the environment, commercial agriculture, forest crop production and human health. DAMF rules, specifically AGR 3800, state that "no person shall knowingly collect, transport, sell distribute, propagate or transplant any living or viable portion of any listed prohibited invasive plant species including all of their cultivars, varieties and specified hybrids." Pursuant to this rule, the project area was reviewed for invasive species during the initial phases of design. Several occurrences of Garlic mustard, Glossy buckthorn, Japanese knotweed, Morrow's honeysuckle, Multiflora rose, Oriental bittersweet, Purple loosestrife, Spotted knapweed and Tree of Heaven were found within the project area. If these plants will be impacted during construction they shall be handled and disposed of in accordance with the NHDOT's Best Management Practices for Roadside Invasive Plants manual. Fill materials brought onsite or transported within the site will be free of invasive species or treated in accordance with the above noted BMP manual to prevent the spread of such species.

Appendix A Wetland Functional Assessments

Wetland Function-Value Evaluation Form

Total area of wetland Unknown Human made? NO Is wetland part of a wildlife corridor? Yes Or a "habitat island"? NO

Adjacent land use Roadway, residential, forest Distance to nearest roadway or other development Adjacent

Dominant wetland systems present R2UB3 Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Center

How many tributaries contribute to the wetland? 10+ Wildlife and vegetation diversity/abundance (see attached list)

Wetland I.D. 1A, 20, 21, 22

Latitude _____ Longitude _____

Prepared by: SH/CEI Date: 2.25.2015

Wetland Impact:

Type: Dredge/Fill Area: See Plan

Evaluation based on:

Office: ✓ Field: _____

Corps manual wetland delineation completed? No

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/ Value(s)	Comments
	Y	N			
Groundwater Recharge/Discharge	✓		1,2,7,8,15		
Floodflow Alteration	✓		1,6,7,8,10,11,13	✓	
Fish and Shellfish Habitat	✓		1,3,4,5,6,7,8,13,14,16,17	✓	Stocked annually with trout, 32 species of fish documented including warm water, cold water and anadromous fish species.
Sediment/Toxicant Retention	✓		1,8,10,12		
Nutrient Removal	✓		1,2,4,5		
Production Export	✓		1,4,6		
Sediment/Shoreline Stabilization	✓		1,3,4,7,8,9,10,11,12		
Wildlife Habitat	✓		2,6,7,8,9,10,11,12	✓	
Recreation	✓		1,2,5,6,7,8,9	✓	
Educational/Scientific Value	✓		1,5,6,11	✓	
Uniqueness/Heritage	✓		3,4,7,12,13,14,16,17,18,19,22,24,27,28	✓	Designated as an American Heritage River, National Blueway and part of the Silvio O. Conte National Fish and Wildlife Refuge.
Visual Quality/Aesthetics	✓		1,2,8,9,12	✓	
Endangered Species Habitat	✓		1,2	✓	Multiple species listed as threatened, endangered or of special concern.
Other					

*Refer to backup list of numbered considerations

Notes: Connecticut River & associated banks.

Wetland Function-Value Evaluation Form

Total area of wetland Unknown Human made? NO Is wetland part of a wildlife corridor? No Or a "habitat island"? No

Adjacent land use Roadway, residential, forest, utility Distance to nearest roadway or other development Adjacent

Dominant wetland systems present R4SB3 Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Center

How many tributaries contribute to the wetland? 2+ Wildlife and vegetation diversity/abundance (see attached list)

Wetland I.D. 2,4,5,6,7A,8,9,10A,12

Latitude _____ Longitude _____

Prepared by: SH/CEI Date: 2.26.2015

Wetland Impact:

Type: Dredge/Fill Area: See Plan

Evaluation based on:

Office: ✓ Field: _____

Corps manual wetland delineation completed? No

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/ Value(s)	Comments
	Y	N			
Groundwater Recharge/Discharge	✓		7,15		
Floodflow Alteration	✓		3,5,7		
Fish and Shellfish Habitat	✓		1,2,8		
Sediment/Toxicant Retention	✓		3,10,11,13	✓	
Nutrient Removal	✓		5		
Production Export					
Sediment/Shoreline Stabilization	✓		2		
Wildlife Habitat	✓		5,7		
Recreation					
Educational/Scientific Value					
Uniqueness/Heritage	✓		4,7,12,13		
Visual Quality/Aesthetics	✓		1,2,3		
Endangered Species Habitat					
Other					

*Refer to backup list of numbered considerations

Notes: Intermittent stream locations.

Wetland Function-Value Evaluation Form

Total area of wetland Unknown Human made? NO Is wetland part of a wildlife corridor? No Or a "habitat island"? No

Adjacent land use Roadway, residential, forest, utility Distance to nearest roadway or other development Adjacent

Dominant wetland systems present PFO, PFO1B, PFO1E, PSS, PSS1E, PEM1E, PEM1F

Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Center

How many tributaries contribute to the wetland? 10+ Wildlife and vegetation diversity/abundance (see attached list)

Wetland I.D. 1, 3,10,11,13,14,15B,17B,18A
Latitude _____ Longitude _____
Prepared by: SH/CEI Date: 2.27.2015
Wetland Impact:
Type: Dredge/Fill Area: See Plan
Evaluation based on:
Office: ✓ Field: _____
Corps manual wetland delineation completed? No

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/ Value(s)	Comments
	Y	N			
Groundwater Recharge/Discharge	✓		7,15		
Floodflow Alteration	✓		3,5	✓	
Fish and Shellfish Habitat	✓		2,8		
Sediment/Toxicant Retention	✓		10,11,13,14	✓	
Nutrient Removal	✓		3,5,10		
Production Export	✓		1,2		
Sediment/Shoreline Stabilization	✓		2		
Wildlife Habitat	✓		7,15	✓	
Recreation					
Educational/Scientific Value					
Uniqueness/Heritage	✓		4,7,12,13,17		
Visual Quality/Aesthetics	✓		1,3		
Endangered Species Habitat					
Other					

*Refer to backup list of numbered considerations

Notes: Palustrine forested, scrub-shrub and emergent locations.

Wetland Function-Value Evaluation Form

Total area of wetland Unknown Human made? NO Is wetland part of a wildlife corridor? No Or a "habitat island"? No

Adjacent land use Roadway, residential, forest, utility Distance to nearest roadway or other development Adjacent

Dominant wetland systems present R2UB3, R3UB1 Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Center

How many tributaries contribute to the wetland? 2+ Wildlife and vegetation diversity/abundance (see attached list)

Wetland I.D. 13B, 15A

Latitude _____ Longitude _____

Prepared by: SH/CEI Date: 2.25.2015

Wetland Impact:

Type: Dredge/Fill Area: See Plan

Evaluation based on:

Office: ✓ Field: _____

Corps manual wetland delineation completed? No

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/ Value(s)	Comments
	Y	N			
Groundwater Recharge/Discharge	✓		7,15		
Floodflow Alteration	✓		3,5,6,13	✓	
Fish and Shellfish Habitat					
Sediment/Toxicant Retention					
Nutrient Removal					
Production Export					
Sediment/Shoreline Stabilization					
Wildlife Habitat	✓		6,8,12	✓	
Recreation					
Educational/Scientific Value					
Uniqueness/Heritage	✓		22		
Visual Quality/Aesthetics	✓		1,2		
Endangered Species Habitat					
Other					

*Refer to backup list of numbered considerations

Notes: Perennial stream locations.

Wetland Function-Value Evaluation Form

Total area of wetland Unknown Human made? NO Is wetland part of a wildlife corridor? No Or a "habitat island"? No

Adjacent land use Roadway, residential, forest Distance to nearest roadway or other development Adjacent

Dominant wetland systems present POW Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Center

How many tributaries contribute to the wetland? 2+ Wildlife and vegetation diversity/abundance (see attached list)

Wetland I.D. 1C, 1D, 13A

Latitude _____ Longitude _____

Prepared by: SH/CEI Date: 2.26.2015

Wetland Impact:

Type: Dredge/Fill Area: See Plan

Evaluation based on:

Office: ✓ Field: _____

Corps manual wetland delineation completed? No

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/ Value(s)	Comments
	Y	N			
Groundwater Recharge/Discharge	✓		7,15		
Floodflow Alteration	✓		5,6,10,13	✓	
Fish and Shellfish Habitat					
Sediment/Toxicant Retention	✓		3,10		
Nutrient Removal	✓		2,3,5,14		
Production Export					
Sediment/Shoreline Stabilization	✓		5,7,12,13,15	✓	
Wildlife Habitat	✓		7,8,12	✓	
Recreation					
Educational/Scientific Value					
Uniqueness/Heritage	✓		4,11,12,13,14,17,22	✓	
Visual Quality/Aesthetics	✓		1,2		
Endangered Species Habitat					
Other					

*Refer to backup list of numbered considerations

Notes: Palustrine open water locations.

Appendix A

Wetland evaluation supporting documentation; Reproducible forms.

Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgment and interdisciplinary team consensus. This example provides a comprehensive base, however, and may only need slight modifications for use in other projects.

GROUNDWATER RECHARGE/DISCHARGE— This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

CONSIDERATIONS/QUALIFIERS

1. Public or private wells occur downstream of the wetland.
2. Potential exists for public or private wells downstream of the wetland.
3. Wetland is underlain by stratified drift.
4. Gravel or sandy soils present in or adjacent to the wetland.
5. Fragipan does not occur in the wetland.
6. Fragipan, impervious soils, or bedrock does occur in the wetland.
7. Wetland is associated with a perennial or intermittent watercourse.
8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.
9. Wetland is associated with a watercourse but lacks a defined outlet or contains a constricted outlet.
10. Wetland contains only an outlet, no inlet.
11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.
12. Quality of water associated with the wetland is high.
13. Signs of groundwater discharge are present (e.g., springs).
14. Water temperature suggests it is a discharge site.
15. Wetland shows signs of variable water levels.
16. Piezometer data demonstrates discharge.
17. Other

FLOODFLOW ALTERATION (Storage & Desynchronization) — This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

CONSIDERATIONS/QUALIFIERS

1. Area of this wetland is large relative to its watershed.
2. Wetland occurs in the upper portions of its watershed.
3. Effective flood storage is small or non-existent upslope of or above the wetland.
4. Wetland watershed contains a high percent of impervious surfaces.
5. Wetland contains hydric soils which are able to absorb and detain water.
6. Wetland exists in a relatively flat area that has flood storage potential.
7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.
8. During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
11. Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
12. The watershed has a history of economic loss due to flooding.
13. This wetland is associated with one or more watercourses.
14. This wetland watercourse is sinuous or diffuse.
15. This wetland outlet is constricted.
16. Channel flow velocity is affected by this wetland.
17. Land uses downstream are protected by this wetland.
18. This wetland contains a high density of vegetation.
19. Other

FISH AND SHELLFISH HABITAT (FRESHWATER) — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.

CONSIDERATIONS/QUALIFIERS

1. Forest land dominant in the watershed above this wetland.
2. Abundance of cover objects present.

STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE

3. Size of this wetland is able to support large fish/shellfish populations.
4. Wetland is part of a larger, contiguous watercourse.
5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retain some open water during winter.
6. Stream width (bank to bank) is more than 50 feet.
7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.
8. Streamside vegetation provides shade for the watercourse.
9. Spawning areas are present (submerged vegetation or gravel beds).
10. Food is available to fish/shellfish populations within this wetland.
11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing) are absent from the stream reach associated with this wetland.
12. Evidence of fish is present.
13. Wetland is stocked with fish.
14. The watercourse is persistent.
15. Man-made streams are absent.
16. Water velocities are not too excessive for fish usage.
17. Defined stream channel is present.
18. Other

Although the above example refers to freshwater wetlands, it can also be adapted for marine ecosystems. The following is an example provided by the National Marine Fisheries Service (NMFS) of an adaptation for the fish and shellfish function.

FISH AND SHELLFISH HABITAT (MARINE) — This function considers the effectiveness of wetlands, embayments, tidal flats, vegetated shallows, and other environments in supporting marine resources such as fish, shellfish, marine mammals, and sea turtles.

CONSIDERATIONS/QUALIFIERS

1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
2. Suitable spawning habitat is present at the site or in the area.
3. Commercially or recreationally important species are present or suitable habitat exists.
4. The wetland/waterway supports prey for higher trophic level marine organisms.
5. The waterway provides migratory habitat for anadromous fish.
6. Essential fish habitat, as defined by the 1996 amendments to the Magnuson-Stevens Fishery & Conservation Act, is present (consultation with NMFS may be necessary).
7. Other

SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas.

CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
2. Potential or known sources of toxicants are in the watershed above the wetland.
3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
4. Fine grained mineral or organic soils are present.
5. Long duration water retention time is present in this wetland.
6. Public or private water sources occur downstream.
7. The wetland edge is broad and intermittently aerobic.
8. The wetland is known to have existed for more than 50 years.
9. Drainage ditches have not been constructed in the wetland.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

10. Wetland is associated with an intermittent or perennial stream or a lake.
11. Channelized flows have visible velocity decreases in the wetland.
12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
13. No indicators of erosive forces are present. No high water velocities are present.
14. Diffuse water flows are present in the wetland.
15. Wetland has a high degree of water and vegetation interspersion.
16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation by dense vegetation is present.
17. Other

NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

CONSIDERATIONS/QUALIFIERS

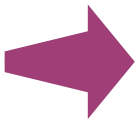
1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.

4. Potential sources of excess nutrients are present in the watershed above the wetland.
5. Wetland saturated for most of the season. Ponded water is present in the wetland.
6. Deep organic/sediment deposits are present.
7. Slowly drained fine grained mineral or organic soils are present.
8. Dense vegetation is present.
9. Emergent vegetation and/or dense woody stems are dominant.
10. Opportunity for nutrient attenuation exists.
11. Vegetation diversity/abundance sufficient to utilize nutrients.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

12. Waterflow through this wetland is diffuse.
13. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
14. Water moves slowly through this wetland.
15. Other

PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.



CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland
3. Economically or commercially used products found in this wetland.
4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic vegetative diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. “Flushing” of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants that are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring, however, no visible signs of export (assumes export is attenuated).
15. Other

SEDIMENT/SHORELINE STABILIZATION — This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.

CONSIDERATIONS/QUALIFIERS

1. Indications of erosion or siltation are present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. Potential sediment sources are present upstream.
5. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
6. A distinct step between the open waterbody or stream and the adjacent land exists (i.e., sharp bank) with dense roots throughout.
7. Wide wetland (>10’) borders watercourse, lake, or pond.
8. High flow velocities in the wetland.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy-absorbing emergents and/or shrubs border a watercourse, lake, or pond.
14. Vegetation is comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation is comprised of a dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other

WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.[1]

CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
6. Wetland is contiguous with other wetland systems connected by a watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.
9. Wetland exhibits a high degree of interspersion of vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland, are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
16. Plant/animal indicator species are present. (List species for project)
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species are present.
23. Signs of wildlife habitat enhancement are present (birdhouses, nesting boxes, food sources, etc.).
24. Other

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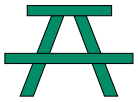
[1]In March 1995, a rapid wildlife habitat assessment method was completed by a University of Massachusetts research team with funding and oversight provided by the New England Transportation Consortium. The method is called WEThings (wetland habitat indicators for non-game species). It produces a list of potential wetland-dependent mammal, reptile, and amphibian species that may be present in the wetland. The output is based on observable habitat characteristics documented on the field data form. This method may be used to generate the wildlife species list recommended as backup information to the wetland evaluation form and to augment the considerations. Use of this method should first be coordinated with the Corps project manager. A computer program is also available to expedite this process.

RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE — This value considers the suitability of the wetland as a site for an "outdoor classroom" or as a location for scientific study or research.

CONSIDERATIONS/QUALIFIERS

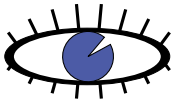
1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.
6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site is within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site is available.
12. Direct access to pond or lake at potential educational site is available.
13. No known safety hazards exist within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other

UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland is primarily urban.
2. Upland surrounding wetland is developing rapidly.
3. More than 3 acres of shallow permanent open water (less than 6.6 feet deep), including streams, occur in wetlands.
4. Three or more wetland classes are present.
5. Deep and/or shallow marsh or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occur in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake exists at potential educational site.
12. Two or more wetland classes are visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) are visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings are found within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland is within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures, or associated features occur within the wetland.
24. Wetland contains critical habitat for a state- or federally-listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.
28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Multiple wetland classes are visible from primary viewing locations.
2. Emergent marsh and/or open water are visible from primary viewing locations.
3. A diversity of vegetative species is visible from primary viewing locations.
4. Wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other

ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

ES

CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.

Appendix B Compensatory Mitigation Proposal

ARM Calculators

Walpole-Charlestown
14747
N.H. Route 12

Compensatory Mitigation Proposal

Project Summary

This project involves the reconstruction of approximately 2.8 miles (14,500 ft) of NH Route 12 between the towns of Walpole and Charlestown, NH. The roadway is located in proximity to the Connecticut River and an active railroad line (referred to as the New England Central Railroad or the Sullivan County Railroad). The current roadway is narrow and contains little to no shoulders for safe bicycle and pedestrian travel. Several sections of the roadway embankments are showing signs of deterioration and in some locations have begun sloughing into the Connecticut River. The proposed project involves widening, shifting and updating NH Route 12 to accommodate for two 12-foot travel lanes and two 4-foot to 5-foot shoulders.

Per NHDES rules (Env-Wt 303.02) this project is classified as a "major impact" project. Per Env-Wt 302.03, the proposed wetland impacts will require mitigation. At the April 21, 2010 Natural Resource Agency Coordination Meeting, two potential mitigation possibilities were discussed. The first possibility involves an undeveloped property located entirely within the Fall Mountain State Forest. The NH Department of Resources and Economic Development (DRED) has expressed interest in adding this property to the Fall Mountain State Forest. The other mitigation possibility that was discussed was a payment in-lieu of mitigation into the Aquatic Resource Mitigation Fund per Env-Wt 803.02. At this meeting it was indicated that either form of mitigation, or a combination thereof, would be acceptable provided the quantities of mitigation adequately offset the proposed impacts.

<u>Size of the Impact (Env-Wt 803.02(a)(1))</u>

A wetland impact plan and table is attached.

During discussions with NHDES (and other) agencies at the April 19, 2017 Natural Resource Agency meeting, it was agreed that the bio-engineering solution proposed for the upper portion of the slope detail (above OHW) consisting of 6" of humus placed over the stone and planted with native vegetation would be self-mitigating thus the bank impacts noted elsewhere in the wetland application is reduced by 5,203 linear feet. A formal planting plan will be provided for the vegetated portion of the proposed slope stabilization. In addition, three to five years of monitoring by the Department to ensure that the vegetation establishes within this area and according to the planting plan is proposed.

Impacts to jurisdictional areas are as follows:

TOTAL IMPACTS FOR WETLANDS AND SHORELAND PERMITS (HIGHLIGHTED ITEMS INCLUDED IN ARM FEE)			
WETLAND IMPACTS			
	WALPOLE	**CHARLESTOWN**	**TOTAL**
PERMANENT NON-WETLAND IMPACTS WITH STREAM IMPACTS (SF):	104,728	43,594	148,322
PERMANENT WETLAND IMPACTS WITH STREAM IMPACTS (SF):	120,496	27,183	147,679
PERMANENT WETLAND IMPACTS (NO STREAM IMPACTS) (SF):	0	25,122	25,122
TEMPORARY IMPACTS (SF):	38,439	63,097	101,536
TOTAL WETLAND/NON-WETLAND IMPACTS (SF):	**263,663**	**158,996**	**422,659**
TOTAL WETLAND/NON-WETLAND IMPACTS (ACRES):	**6.05**	**3.65**	**9.70**
STREAM IMPACTS			
	WALPOLE	**CHARLESTOWN**	**TOTAL**
PERMANENT IMPACTS TO LEFT BANKS (VEGETATED RIPRAP) (LF):	2,726	2,477	5,203
PERMANENT IMPACTS TO LEFT BANKS (LF):	0	57	57
PERMANENT IMPACTS TO RIGHT BANKS (VEGETATED RIPRAP) (LF):	0	0	0
PERMANENT IMPACTS TO RIGHT BANKS (LF):	0	78	78
PERMANENT IMPACTS TO STREAM CHANNEL (VEGETATED RIPRAP) (LF):	0	0	0
PERMANENT IMPACTS TO STREAM CHANNEL (LF):	2,714	2,031	4,745
TOTAL STREAM IMPACTS (VEGETATED RIPRAP) (LF):	**2,726**	**2,477**	**5,203**
TOTAL STREAM IMPACTS (LF):	**2,714**	**2,166**	**4,880**

Note: Only the highlighted items are included in the ARM Fee calculations. Where an area resulted in both a wetland/non-wetland area impact and a linear footage stream impact, the fee was only based on the stream impacts.

Types of Jurisdictional Areas to be Impacted (Env-Wt 803.02(a)(2))
Types of jurisdictional areas to be impacted include: PEM1E, PEM1F, PFO1E, PSS1E, PFO/PSS1E, POW, POWH, PSS/PF01E, R2UB3, R4SB3 and Bank.

Factors Considered for Mitigation (Env-Wt 803.02(a)(3))
Mitigation opportunities were examined within the limits of the proposed project and no wetland creation, restoration or upland buffer preservation opportunities were evident as the area of the right of way is very limited.

Regarding the acquisition of the undeveloped property located entirely within the Fall Mountain State Forest, the Nature Conservancy (one of the conservation easement holders) tried to contact the property owners, to no avail. Since that time the owners have come forward and offered to sell the property, however, given that this property is completely contained within existing

conservation property, it appears that there are little if any development concerns with this property. For that reason acquisition of this property holds low mitigation value. Coordination with the Nature Conservancy, DRED and LCHIP also did not identify any other mitigation properties adjacent to this property or within the surrounding area. As such, this mitigation option was abandoned.

As noted, the other mitigation possibility that was discussed at the original meeting was a payment in-lieu of mitigation into the Aquatic Resource Mitigation Fund per Env-Wt 803.02. This is the mitigation proposed for this project.

Functional Assessment of Impacted Jurisdictional Areas (Env-Wt 803.02(b))
Wetland Function-Value Evaluation Forms are attached for the wetland systems that will be impacted by this project. These forms contain the natural community classifications in the notes section.

Also attached is a digital survey of the project area and correspondence with USF&WS and the NH Natural Heritage Bureau indicating:

- No species or habitats under the jurisdiction of the USF&WS were identified within the project area;
- The proposed wetland impact areas within the project area are not indicative of typical Dwarf Wedge Mussel habitat. In addition, the previously mentioned Dwarf Wedge Mussel survey did not yield any evidence of the presence of animals and therefore no impact to this Federally endangered species are anticipated;
- A review of the project area did not find any occurrences of the Northeastern Bulrush within the areas that would be impacted and the USF&WS indicated that no further consultation with their agency was necessary;
- A review of the project area did not find any occurrences of the grass-leaved mud-plantain within the areas that would be impacted and the USF&WS indicated that no further consultation with their agency was necessary;
- NHF&G indicated there are known populations of the Bald Eagle in the area surrounding the proposed project. DOT has surveyed 8-inch diameter or larger trees that will be removed in the vicinity of the existing roadway and submitted this information to NHF&G. The Department has committed to notifying NHF&G of any sightings of eagles carrying nesting materials in the vicinity of the project;
- An Essential Fish Habitat (EFH) Study was prepared by DOT and reviewed by the National Marine Fisheries Services (NMFS). NMFS has indicated that there are no concerns with the project as proposed and further coordination is necessary.

Compensation Amount (Env-Wt 803.04)
The total impacts requiring a mitigation fee are 25,122 s.f. of permanent wetland jurisdiction impacts (the remaining 147,679 s.f. are redundant with stream impacts and will be covered under the stream impact fee) and 4,880 l.f. of permanent stream and streambank impacts (the remaining 5,203 l.f. are self-mitigating through the installation of the bio-engineered solution). According to the ARM fund calculator available on the DES website, the ARM fund payment for these impacts is:

	WALPOLE	**CHARLESTOWN**	**TOTAL**
PERMANENT WETLANDS & NON-WETLANDS	$0	$91,826.25	$91,826.25
PERMANENT STREAM IMPACTS	$665,038.56	$530,756.64	$1,195,795.20
TOTAL	**$665,038.56**	**$622,582.89**	**$1,287,621.45**

The payment amounts needs to be confirmed by the Wetlands Bureau.

DES AQUATIC RESOURCE MITIGATION FUND
WETLAND PAYMENT CALCULATION
(Charlestown - Wetland Impacts)

1	**Convert square feet of impact to acres:**		
INSERT SQ FT OF IMPACT	Square feet of impact	25122.00	
		43560.00	
	Acres of impact =	0.5767	
2	**Determine acreage of wetland construction:**		
	Forested wetlands:	0.8651	
	Tidal wetlands:	1.7302	
	All other areas:	0.8651	
3	**Wetland construction cost:**		
	Forested wetlands:	$74,781.33	
	Tidal Wetlands:	$149,562.65	
	All other areas:	$74,781.33	
4	**Land acquisition cost (See land value table):**		
INSERT LAND VALUE FROM TABLE WHICH APPEARS TO THE LEFT. (Insert the amount do not copy and paste.)	Town land value:	2012	
	Forested wetlands:	$1,740.55	
	Tidal wetlands:	$3,481.09	
	All other areas:	$1,740.55	
5	**Construction + land costs:**		
	Forested wetland:	$76,521.87	
	Tidal wetlands:	$153,043.74	
	All other areas:	$76,521.87	
6	**DES Administrative cost:**		
	Forested wetlands:	$15,304.37	
	Tidal wetlands:	$30,608.75	
	All other areas:	$15,304.37	
**********	**TOTAL ARM PAYMENT**********		
	Forested wetlands:	$91,826.25	
	Tidal wetlands:	$183,652.49	
	All other areas:	$91,826.25	

DES AQUATIC RESOURCE MITIGATION FUND
STREAM PAYMENT CALCULATION
(Walpole - Channel Impacts)

INSERT LINEAR FEET OF IMPACT on BOTH BANKS AND CHANNEL	**Right Bank**	0.00
	Left Bank	0.0000
	Channel	2714.0000
	TOTAL IMPACT	2714.0000
	Stream Impact Cost:	$554,198.80
	DES Administrative cost:	
		$110,839.76
	********* **TOTAL ARM FUND STREAM PAYMENT*********	
		$665,038.56

DES AQUATIC RESOURCE MITIGATION FUND
STREAM PAYMENT CALCULATION
(Charlestown - Channel Impacts)

INSERT LINEAR FEET OF IMPACT on BOTH BANKS AND CHANNEL	**Right Bank**	78.00
	Left Bank	57.0000
	Channel	2031.0000
	TOTAL IMPACT	2166.0000
	Stream Impact Cost:	$442,297.20
	DES Administrative cost:	
		$88,459.44
	********* **TOTAL ARM FUND STREAM PAYMENT*********	
		$530,756.64

ARM Impacts & Fees

	Walpole		Charlestown		Total	
	Impact	Fee	Impact	Fee	Impact	Fee
Permanent Wetlands & Non-Wetlands	0.0 sf	$ -	25122.0 sf	$ 91,826.25	25,122.0 sf	$ 91,826.25
Permanent Stream Impacts	2714.0 lf	$ 665,038.56	2166.0 lf	$ 530,756.64	4,880.0 lf	$ 1,195,795.20
Total		$ 665,038.56		$ 622,582.89		$ 1,287,621.45

Appendix C Rare Species

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

To: Matthew Lundsted, Comprehensive Environmental Inc
21 Depot Street
Peterborough, NH 03054

From: Amy Lamb, NH Natural Heritage Bureau
Date: 1/10/2017 (valid for one year from this date)
Re: Review by NH Natural Heritage Bureau
NHB File ID: NHB16-3895 Town: Charlestown, Walpole Location: Route 12
Description: Reconstruction of Route 12 beginning at its junction with Main Street in North Walpole continuing approximately 2.7 miles to the NH Route 12A junction in Charlestown including CT River bank stabilization, reconstruction and bank erosion repairs. (Follow-up to NHB15-1868)
cc: Kim Tuttle

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Comments: Some plant surveys have already been conducted for grass-leaved mud-plantain, but additional surveys would be requested if additional work is proposed in the Connecticut River (such as stabilization that would require work or placement of riprap in the river). Contact NH Fish & Game regarding wildlife concerns.

Invertebrate Species	**State[1]**	**Federal**	**Notes**
Dwarf Wedge Mussel (*Alasmidonta heterodon*)	E	E	Contact the NH Fish & Game Dept and the US Fish & Wildlife Service (see below).

Natural Community	**State[1]**	**Federal**	**Notes**
Circumneutral rocky ridge*	--	--	Threats would primarily be trampling by recreational hikers.

Plant species	**State[1]**	**Federal**	**Notes**
grass-leaved mud-plantain (*Heteranthera dubia*)*	T	--	Threats to aquatic species include changes in water quality, e.g., due to pollution and stormwater runoff, and significant changes in water level.

Vertebrate species	**State[1]**	**Federal**	**Notes**
Bald Eagle (*Haliaeetus leucocephalus*)	T	--	Contact the NH Fish & Game Dept (see below).

[1]Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

Contact for all animal reviews: Kim Tuttle, NH F&G, (603) 271-6544.

Department of Resources and Economic Development
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DRED/NHB
172 Pembroke Rd.
Concord, NH 03301

Memo

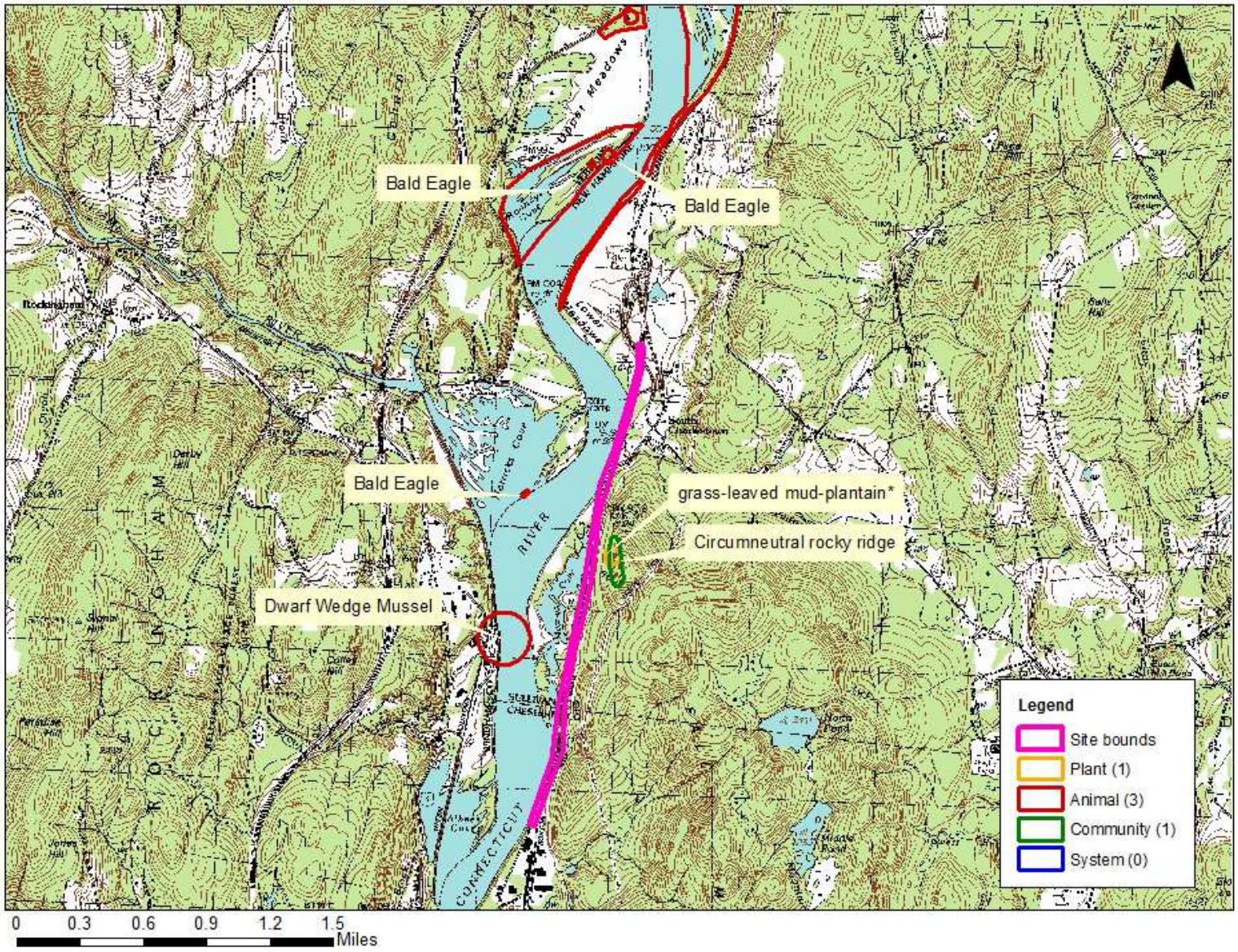
NH Natural Heritage Bureau
NHB Datacheck Results Letter

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

Department of Resources and Economic Development
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DRED/NHB
172 Pembroke Rd.
Concord, NH 03301

NHB16-3895


Bald Eagle
Bald Eagle
Bald Eagle
grass-leaved mud-plantain*
Circumneutral rocky ridge
Dwarf Wedge Mussel
Legend
Site bounds
Plant (1)
Animal (3)
Community (1)
System (0)
0 0.3 0.6 0.9 1.2 1.5
Miles

New Hampshire Natural Heritage Bureau - Animal Record

Dwarf Wedge Mussel (*Alasmidonta heterodon*)

Legal Status		**Conservation Status**	
Federal:	Listed Endangered	Global:	Critically imperiled due to rarity or vulnerability
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2004: Rockingham: 2 live mussels observed.
General Area: 2004: Rockingham: Mussels within 3m of the riverbank, in depths of about 0.5m, in sandy substrate, and near beds of submerged vegetation.
General Comments:
Management Comments:

Location

Survey Site Name: Herricks Cove, south of
Managed By:

County: Sullivan
Town(s): Charlestown
Size: 30.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2004: Rockingham: Near western shore of Connecticut River, Charlestown, just north of border with Walpole.

Dates documented

First reported:	2004-09-16	Last reported:	2004-09-16

The U.S. Fish & Wildlife Service has jurisdiction over Federally listed species. Please contact them at 70 Commercial Street, Suite 300, Concord NH 03301 or at (603) 223-2541.

New Hampshire Natural Heritage Bureau - Community Record

Circumneutral rocky ridge

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank:	Historical records only - current condition unknown.
Comments on Rank:	Full complement of serpentine plants not present.
Detailed Description:	1985: Xeric ledge dominated by Woodsia ilvensis (rusty woodsia), Deschampsia flexuosa (common hairgrass), and Diervilla lonicera (bush honeysuckle). Acidic except for Cerastium arvense (field chickweed), Agalinis tenuifolia (slender gerardia) dominated area, which may be mafic. Steep, open slopes with very thin soil over bedrock.
General Area:	1985: Grassy, rocky glade at top of steep western slope of Fall Mountain.
General Comments:	1985: Selaginella rupestris (rock spikemoss) uncommon and occurs here. Revisit needed. Lacks complement of species to be classified as serpentine.
Management Comments:	

Location

Survey Site Name: Fall Mountain
Managed By:

County: Sullivan
Town(s): Charlestown
Size: 7.4 acres Elevation: 700 feet

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Charlestown. Fall Mountain, across the Connecticut River from Bellows Falls, VT. This site is at northern extreme of the Fall Mountain ridge.

Dates documented

First reported: 1985 Last reported: 1985-09-25

New Hampshire Natural Heritage Bureau - Plant Record

grass-leaved mud-plantain (*Heteranthera dubia*)

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Threatened	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1985: Rawinski specimen TJR85-1207.
General Area:
General Comments:
Management Comments:

Location

Survey Site Name: Fall Mountain Marshes
Managed By:

County: Sullivan
Town(s): Charlestown
Size: 2.8 acres Elevation: 500 feet

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Charlestown. Fall Mountain marshes.

Dates documented

First reported: 1985-09-25 Last reported: 1985-09-25

New Hampshire Natural Heritage Bureau - Animal Record

Bald Eagle (*Haliaeetus leucocephalus*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Threatened	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2015: Nest 3: 1 chick fledged. 2014: Nest 2: Nest active, no chicks fledged. 2013: Nest 2: 2 chicks fledged. 2012: Nest 2: 2 chicks fledged. 2011: Nest 2: 2 chicks fledged. 2010: Nest 1: 1 chick fledged. 2009: Nest 1: Nest built, no chicks fledged.
General Area:
General Comments: 2009: Nest in Vermont, but breeding territory probably extends into New Hampshire.
Management Comments:

Location

Survey Site Name: Upper Meadows
Managed By:

County: Sullivan
Town(s): Charlestown
Size: 4.3 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions:

Dates documented

First reported:	2009	Last reported:	2015

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Bald Eagle (*Haliaeetus leucocephalus*)

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Threatened	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2012: 1 eagle observed on 2/25.2010: 1 eagle observed on 1/9.2009: 1 eagle observed on 1/10.
General Area:
General Comments:
Management Comments:

Location

Survey Site Name: Upper Meadows
Managed By:

County: Sullivan
Town(s): Charlestown
Size: 216.5 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions:

Dates documented

First reported:	2009-01-10	Last reported:	2012-02-25

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

Stoney Ridge
ENVIRONMENTAL LLC

August 18, 2015

Mr. Jonathan Evans
Project Manager
NH Department Of Transportation
P.O. Box 483
7 Hazen Drive
Concord, NH 03302-0483

Re: **NH DOT Project No. 14747**
NH Route 12 Walpole to Charlestown
Aquatic Plant Survey

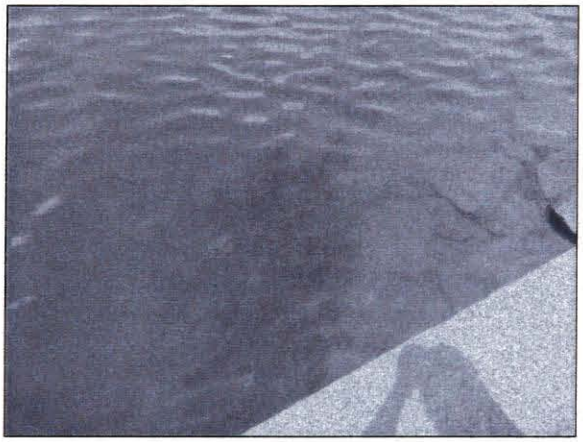
Dear Mr. Evans,

Stoney Ridge Environmental LLC (SRE) is submitting this letter report to document the results of field surveys for two aquatic bed plants which the New Hampshire Natural Heritage Bureau records indicated could be present within the immediate vicinity of the project area surrounding NH Route 12. Record of grass-leaved mud plantain (*Heteranthera dubia*) and long-leaved pondweed (*Potamogeton nodosus*) occurs in areas of the Connecticut River and Wetlands within the vicinity of the project area. SRE conducted a survey for these plants on August 6 and 12, 2015 in the general vicinity of the survey areas highlighted on the NH DOT aerial photo mapping provide to SRE by you. Suitable habitat and potential locations of these plants were identified during a land-based survey on August 6, 2015. Based on the observations of this survey and the project mapping provided by NH DOT a water-based survey, from kayaks, was conducted for specific locations on August 12, 2015. The survey occurred at the height of the grass-leaved mud plantain flowering period (early august) and within the flowering period of long-leaved pondweed (July through early September).

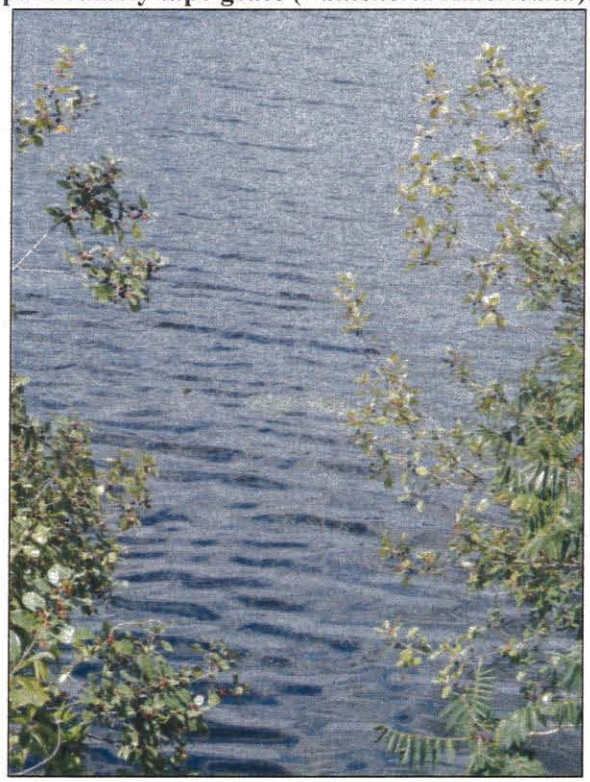
Suitable habitat for grass-leaved mud plantain is described as submerged shore, mudflat or sediment bar habitats in 0 -4 feet of water. It is easily recognized as having aquatic leaves without mid-veins and yellow flowers. Suitable habitat for long-leaved pondweed is described as four or more feet of water over a mucky, soft bottom.

No grass-leaved mud plantain plants or communities were observed on either day of surveys. All areas with the appropriate water depth range were established with water celery (*Vallisneria americana*), yellow water lily (*Nuphar lutea*), elodea (*Elodea sp.*) and white water lily (*Nymphaea alba*) and in shallower water by arrow arum (*Peltandra virginica*), pickerelweed (*Pontedaria cordata*) and duck potato (*Saggitaria lancifolia*). Areas 1, 2 and 3 were of an

appropriate depth however, yellow water lily was dominant and so numerous as to the point of shading the aquatic bed. The emergent and aquatic bed wetlands in areas 5 and 7 had appropriate water depths for grass-leaved mud plantain however; these areas were dominated by pickerelweed, duck potato and broad-leaved cattail (*Typha latifolia*). The Connecticut River adjacent wetlands from Area 4 and 6 were suitable habitat for long-leaved pondweed. Several hours were spent surveying this area from the water and two other species of pondweed bassweed (*Potageton amplifolus*) and floating pondweed (*Potamogeton natans*) were observed however, no long-leaved pond weed was observed.



A view of Area 4 from atop the concrete headwall. Note aquatic bed plants are present in the area, particularly tape grass (*Vallisneria Americana*).



The floating leaves of pondweeds as observed from the western roadway embankment on August 6, 2015.

In the vicinity of Area 6. Note the floating pondweed leaves in the foreground. These were identified as bassweed.

Areas 1, 2, 3, 5 and 7 were surveyed but none of the protected species were observed and the plant communities present were not consistent with described suitable habitat of either grass-leaved mud plantain or long-leaved pondweed.

If there are any additional questions regarding this project, please feel free to contact us at (603) 776-5825.

Sincerely,
Stoney Ridge Environmental, LLC

Cynthia M. Balcius CSS, CWS, CPESC
Senior Project Manager

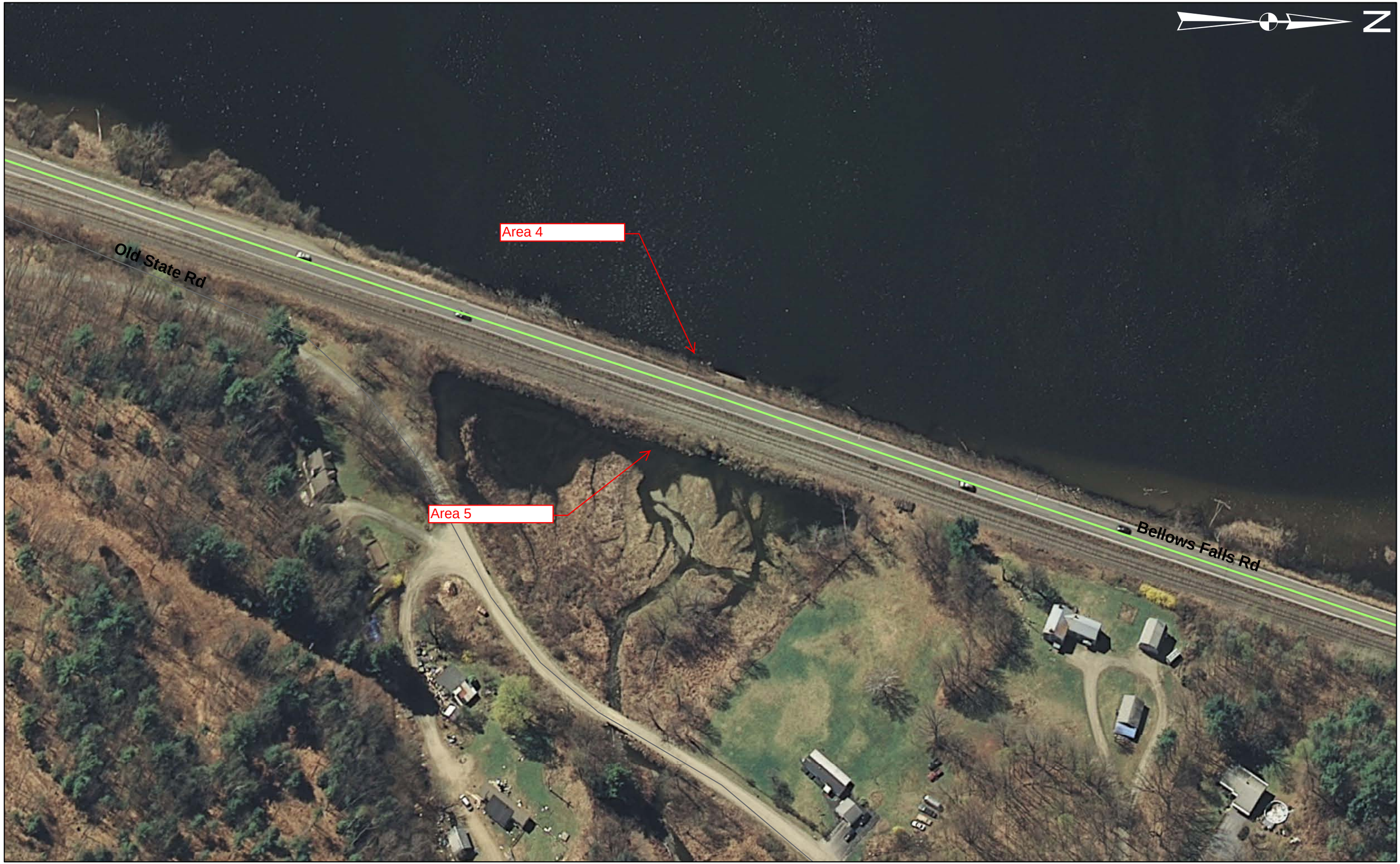
Richard Bolton
Project Manager

Stoney Ridge ENVIRONMENTAL LLC

0 50 100 200
Feet

1:1,200

1 inch = 100 feet



0 50 100 200
Feet

1:1,200

1 inch = 100 feet

0 50 100 200 Feet

1:1,200

1 inch = 100 feet

Area 1

Area 2

Area 3

PRELIMINARY PLANS
SUBJECT TO CHANGE
DATE 5/26/2015

50 0 50 100
SCALE IN FEET

WALPOLE – CHARLESTOWN
14747 – 14747A
MAY 2015

SHEET 6 OF 11

PRELIMINARY PLANS
SUBJECT TO CHANGE
DATE 5/26/2015

SHEET 7 OF 11

WALPOLE - CHARLESTOWN
14747 - 14747A
MAY 2015

Connecticut River

PRELIMINARY PLANS
SUBJECT TO CHANGE
DATE 5/26/2015

SCALE IN FEET
50 0 50 100

WALPOLE – CHARLESTOWN
14747 – 14747A
MAY 2015

SHEET 8 OF 11

14747 request for endangered aquatic species review.dgn Default 5/26/2015 7:11:18 AM n34sdf

Stoney Ridge
ENVIRONMENTAL LLC

September 4, 2015

Mr. Jonathan Evans
Project Manager
NH Department Of Transportation
P.O. Box 483
7 Hazen Drive
Concord, NH 03302-0483

Re: **NH DOT Project No. 14747**
NH Route 12 Walpole to Charlestown
Threatened and Endangered Plant Survey

Dear Mr. Evans,

Stoney Ridge Environmental LLC (SRE) is submitting this letter report to document the results of field surveys for five threatened and endangered plant species which the New Hampshire Natural Heritage Bureau records indicated could be present within the immediate vicinity of the project area surrounding NH Route 12. Record of Fogg's goosefoot (*Chenopodium foggii*), four-leaved milkweed (*Asclepias quardrifolia*), large-bracted tick-trefoil (*Desmodium cuspidatum*), upland thoroughwort (*Eupatorium sessilifolium*) and Virginia tickseed (*Hackelia virginiana*) within the vicinity of the project area. SRE conducted a survey for these plants on August 6 and 27, 2015 in the general vicinity of the survey areas highlighted on the NH DOT aerial photo mapping. The habitat and plant survey for *A. quadrifolia* occurred on august 6, 2015 consistent with its flowering period in late July. The balance of these plants were surveyed during the flowering period on August 27, 2015.

Suitable habitat for *C. foggii* is described as "rocky slopes and outcrops in sparsely wooded areas associated with enriched rocky woods and circumneutral talus slopes" (Massachusetts Natural Heritage and Endangered Species Program, *Chenopodium foggii* fact sheet, 2007). Suitable habitat for *A. quadrifolia* has been described as "dry to mesic open deciduous forest on rocky or steep slopes in enriched or circumneutral soil" (.http://www.ct-botanical-society.org/galleries/asclepiasquad.html). Suitable habitat for *D. cuspidatum* is described as "rocky open forest edges, rocky ridges, shrub dominated landscapes with circumneutral or alkaline bedrock" (https://gobotany.newenglandwild.org/species/desmodium/cuspidatum/). Suitable habitat for *E. sessilifolia* is described as "rocky forests, woodland and edges of rocky

balds" (.https://gobotany.newenglandwild.org/species/eupatorium/sessilifolium/). Suitable habitat for *H. virginiana* is described as "mesic, deciduous forests, talus, cliff bases, usually in regions of high-pH bedrock" (https://gobotany.newenglandwild.org/species/hackelia/virginiana/).

None of the protected plants where observed during the August 6th or 27th surveys. Several areas in the vicinity of the project have suitable habitat for these species, open deciduous forest on steep and rocky slopes in localized areas of circumneutral soils. During the survey the soil pH was generally assessed by the presence of other plants which prefer circumneutral conditions, sugar maple (*Acer saccharum*), basswood (*Tilia americana*), cottonwood (*Populus deltoides*), willows (*Salix sp.*), Christmas fern (*Polystichum acrostichoides*) and a lack of sedge (*Carex sp.*) dominance in seep areas. Rocky and cliff habitats east of the rail road tracks with the appropriate plant community were paid more attention than gentler slopes with white pine (*Pinus strobus*), red oak (*Quercus rubra*), huckleberry (*Gaylussacia sp*) and sweetfern (*Comptonia peregrina*) vegetative community. In the areas with associated plat communities and suitable physical conditions, SRE did not observe any of the listed species.

Photo1

Photo 2

Photo 1: A view of a gentle slope east of the railroad tracks which were not considered suitable habitat. Note a semi open canopy dominated by red oak and a huckleberry in the herbaceous structural level.

Photo 2: A view near a seep east of the railroad tracks which was considered suitable habitat. Note a semi open canopy dominated by sugar maple with Solomon's seal (*Polygonatum biflorum*) in the herbaceous structural layer.

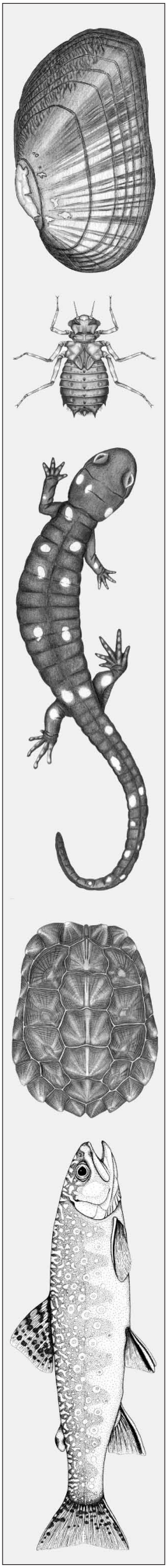
If there are any additional questions regarding this project, please feel free to contact us at (603) 776-5825.

Sincerely,
Stoney Ridge Environmental, LLC

Cynthia M. Balcius CSS, CWS, CPESC
Senior Project Manager / Plant Biologist

Richard Bolton
Project Manager

Stoney Ridge
ENVIRONMENTAL LLC



Comprehensive Environmental, Inc.
21 Depot Street
Merrimack, New Hampshire 03054

biodrawversity
ecological consulting and communications

July 16, 2016

REPORT

Dwarf Wedgemussel Survey in the Connecticut River for the Route 12 Expansion Project (Walpole, New Hampshire)

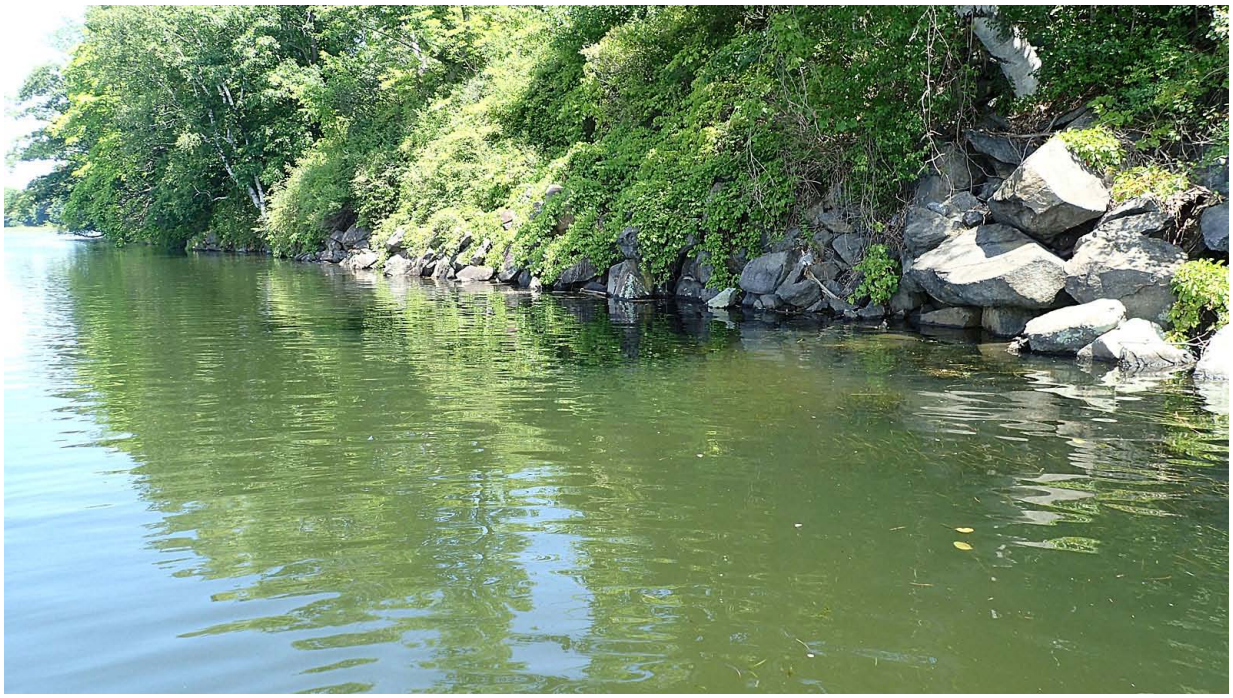
INTRODUCTION

Biodrawversity completed a freshwater mussel survey in the Connecticut River along a section of Route 12 in Walpole, New Hampshire, where the New Hampshire Department of Transportation (NHDOT) is proposing to widen the roadway to accommodate safety concerns. The survey was required as part of the environmental review and permitting for the proposed road project. The target mussel species included the Dwarf Wedgemussel (*Alasmidonta heterodon*), which is listed as Endangered in New Hampshire and by the U.S. Fish and Wildlife Service (USFWS). The study had three objectives:

1. Determine if Dwarf Wedgemussels occur in the Connecticut River along the portion of the Route 12 embankment where construction is proposed.
2. Collect information on Dwarf Wedgemussel population size and habitat quality/availability to determine the possible effects of construction.
3. If Dwarf Wedgemussels were found, provide recommendations for a relocation and monitoring plan that is consistent with protocols used by the USFWS and New Hampshire Fish and Game.

METHODS

The survey was conducted on July 12, 2016. At the time of the survey, the river levels, water temperature, and water clarity were all conducive for finding mussels with visual searches. Qualitative mussel surveys were conducted along the length of the embankment where construction is proposed



Connecticut River in North Walpole, NH, along the bank where road construction is proposed.

(~650 meters) in water depths ranging from 3-20 ft, and generally within 30-40 meters of the shoreline The area was surveyed by SCUBA diving; two biologists spent approximately 12 person-hours searching for mussels in this reach. Biologists recorded mussel density, water depth, and habitat. Biologists planned to collect additional data on Dwarf Wedgemussels, but this was not necessary because Dwarf Wedgemussels were not detected during the survey.

RESULTS

Mussels: Neither live individuals, nor shells, of Dwarf Wedgemussels were found. Live individuals of three native mussel species were found: Eastern Elliptio (*Elliptio complanata*), Eastern Lampmussel (*Lampsilis radiata*), and Eastern Floater (*Pyganodon cataracta*). Eastern Elliptio was very dense, exceeding 100/m^2 in some areas, especially in the 5-12 ft depth range, and outnumbering Eastern Lampmussels by at least 20:1. Only one Eastern Floater was found.

Habitat: Shallow areas (<2 ft) were very rocky, with large angular boulders (riprap) and very few mussels. Farther offshore, the riprap was embedded in silt, with varying amounts of detritus and coarse wood. Tapegrass (*Vallisneria* sp.) was common in depths of 2-8 ft, and diminished in abundance in deeper water. The steep bank, with riprap and silt, extended down to a maximum depth of 17-20 ft. Most of the survey area was part of a large backwater area, thus there was no noticeable flow.

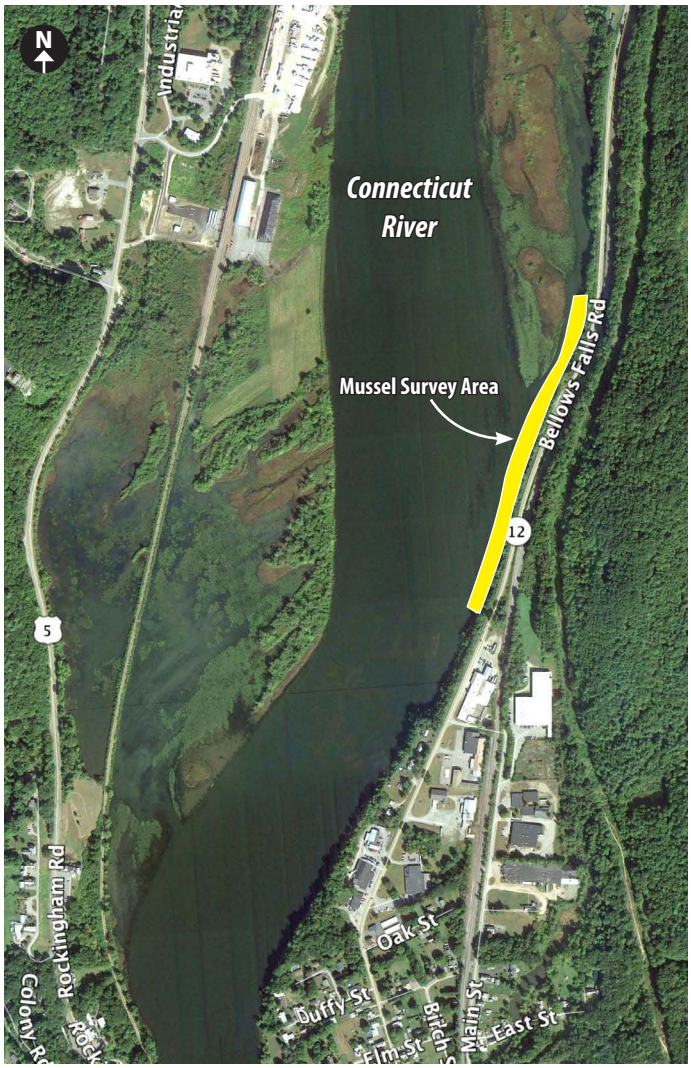


Figure 1. Dwarf Wedgemussel survey area in the Connecticut River along Route 12 in Walpole, NH.

RECOMMENDATION

Based on these survey results, and results of similar surveys conducted in the lower impoundment of the Bellows Falls Dam for TransCanada in 2011, it does not appear the Dwarf Wedgemussels occur in this area of the Connecticut River. Thus, the proposed road construction project should have no effect on Dwarf Wedgemussels, and we do not recommend any further mussel surveys or monitoring.


Walpole-Charlestown, 14747
N
Potential Recreational Easement
0 100 200 400 600
Feet
1:2,400
1 inch = 200 feet

Matt Lundsted

From: Matt Lundsted
Sent: Tuesday, January 3, 2017 1:37 PM
To: Matt Lundsted
Subject: FW: Walpole-Charlestown, 14747, Field Review (Bald Eagles) NHB14-3112
Attachments: 14747 Large Aerial Small size.pdf; NHB14-3112_Evans.pdf; NHB09-2261_Evans1.pdf; Bulrush OK & No Federal Species.pdf; Dwarf Wedgemussels OK.PDF

-----Original Message-----
From: Tuttle, Kim [mailto:Kim.Tuttle@wildlife.nh.gov]
Sent: Wednesday, August 27, 2014 1:52 PM
To: Jonathan Evans
Subject: Walpole-Charlestown, 14747, Field Review (Bald Eagles) NHB14-3112

Jonathan,

The NHFG Nongame and Endangered Wildlife Program has reviewed NHB14-3112 for the proposed relocation of the New England Central Railroad and NH Route 12 between the towns of Walpole and Charlestown, NH. The NHB database check indicated the state and federally endangered dwarf wedgemussel and the state threatened bald eagle in the vicinity of the project. We concur with the 2010 finding by Susi von Oettingen, USFWS, of no expected impact to dwarf wedgemussel as habitat does not appear to be present. The situation with eagle use in that section has not changed much, with one exception. Evidently the nest located on the VT side of the river just above Roundy's Cove has fallen from the tree. It is unclear at this point where the resident pair of bald eagles will construct a new nest. They have used 4 separate locations since the mid-2000s. There is a possibility they might select a tree located on the NH side of the river and nearer to Rte 12, which could create some issues. Just be aware of this as a possibility - any bald eagles carrying sticks or other nesting materials on the NH side of the river should be immediately reported to us so that we can follow up.

Please feel free to call me if you have any questions regarding this review.

Sincerely,

Kim Tuttle
Certified Wildlife Biologist
NH Fish and Game
11 Hazen Drive
Concord, NH 03301
603-271-6544

-----Original Message-----
From: Jonathan Evans [mailto:JEvans@dot.state.nh.us]
Sent: Monday, August 25, 2014 12:13 PM
To: Tuttle, Kim
Cc: Henderson, Carol

Subject: RE: FW: Walpole-Charlestown, 14747, Field Review (Bald Eagles)

Hi Kim,

Attached is an aerial photo showing the maximum extent of the proposed right-of-way and/or drainage/construction easements necessary to construct the subject project. It is unlikely that this project will require disturbance of this entire area, however this outline should hopefully give you an idea of the maximum possible extent of impact. This aerial photo also shows the results of the tree inventory conducted on 8/18/14. Per our discussion several weeks ago, this inventory includes all pines over 12" d.b.h. adjacent to the western side of the roadway. Several of the trees were inaccessible to the surveyor as they were located on private property or in an area that was unsafe to access. The approximate location of these trees are noted on the map.

Also attached, please find an updated NHNHB search as well as the original 2009 NHB search and some subsequent coordination with the USF&WS.

To answer your below question, yes, the project location/design has not changed from that which we looked at during our site walk a few years ago. The only changes that have been made are to further refine the drainage within the footprint that was previously reviewed.

Please take a look at this information and let me know if you have any further questions or concerns regarding any of the species highlighted in the updated NHB search.

Thanks,
Jon
~~~~~~~~~~~

Jonathan Evans
Air & Noise Program Manager
NH Department of Transportation
Bureau of Environment
7 Hazen Dr., PO Box 483
Concord, NH 03302-0483
Email: jevans@dot.state.nh.us
Phone: (603)271-4048 M-F 7AM-3PM
Fax:(603)271-7199

-----Original Message-----
From: Tuttle, Kim [mailto:Kim.Tuttle@wildlife.nh.gov]
Sent: Friday, August 22, 2014 11:53 AM
To: Jonathan Evans
Subject: RE: FW: Walpole-Charlestown, 14747, Field Review (Bald Eagles)

Hi Jon,

Can you clarify for me if the project location /tree clearing , etc. is basically the same as what we looked at on our site walk a few years ago? Has the job shifted further to the east vs what we looked at back then?

Thanks,
Kim

-----Original Message-----
From: Tuttle, Kim [mailto:Kim.Tuttle@wildlife.nh.gov]
Sent: Wednesday, August 13, 2014 1:55 PM
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To: Jonathan Evans
Cc: Henderson, Carol
Subject: RE: FW: Walpole-Charlestown, 14747, Field Review (Bald Eagles)

Jonathan,

Do you have an updated NHB file number? I'll also need an aerial view of the site. I will then send it out to the eagle biologist and see if we will still require the inventory. The eagle nest and roosting sites in this area may have changed in the last 4 years.

Kim

Kim Tuttle
Certified Wildlife Biologist
NH Fish and Game
11 Hazen Drive
Concord, NH 03301
603-271-6544

-----Original Message-----
From: Jonathan Evans [mailto:JEvans@dot.state.nh.us]
Sent: Wednesday, August 13, 2014 1:49 PM
To: Tuttle, Kim
Cc: Henderson, Carol
Subject: RE: FW: Walpole-Charlestown, 14747, Field Review (Bald Eagles)

Hi Kim,

Hopefully you may recall the subject project which involves relocation of the New England Central Railroad and NH Route 12 between the towns of Walpole and Charlestown, NH. If you need a refresher there is quite a bit of information on the project's website at: http://www.nh.gov/dot/projects/walpole14747/index.htm A plan showing the proposed project can be found here: http://www.nh.gov/dot/projects/walpole14747/documents/draft_public_hearing_planlr.pdf

As you may recall, you indicated that due to the presence of Bald Eagle activity along the CT River in this area, we need to do a tree inventory of any trees over 8" d.b.h. that will be removed from the west side of the existing roadway. Fortunately the majority of the work involved in this project will require a shift of the railroad and roadway to the east of their existing locations, so there shouldn't be much clearing to the west. Now that we have a good handle on the limits of any necessary clearing, the Department plans on completing this inventory in the near future.

My question to you is what exactly are you looking for in this inventory and how would you like this information relayed? I envision using GPS to locate each tree over 8" d.b.h. and then providing this in a ArcMap GIS file. Is this acceptable to you? Would you like any other information on these trees (i.e. species, tree condition, etc.)?

Thank you very much for your help.

-Jon
~~~~~~~~~~~

Jonathan Evans
Air & Noise Program Manager
NH Department of Transportation
~~~~~~~~~~~

Bureau of Environment
7 Hazen Dr., PO Box 483
Concord, NH 03302-0483
Email: jevans@dot.state.nh.us
Phone: (603)271-4048 M-F 7AM-3PM
Fax:(603)271-7199

-----Original Message-----
From: Tuttle, Kim [mailto:Kim.Tuttle@wildlife.nh.gov]
Sent: Thursday, May 06, 2010 3:44 PM
To: Jonathan Evans
Cc: Henderson, Carol; Marchand, Michael
Subject: RE: FW: Walpole-Charlestown, 14747, Field Review (Bald Eagles)

Jon,

Thank you for the additional information. I will be attending the site walk on May 18th to evaluate for potential eagle impacts. The Vermont nesting pair is known to use the Connecticut River shoreline trees on the NH side throughout the whole length of the proposed project. We will need an inventory of any trees over 8" d.b.h. proposed to be removed west of the existing roadway. Tree removal should be kept to an absolute minimum here as any large trees along the shoreline may be used by the state threatened bald eagle for perching, roosting or future nest trees.

Sincerely,

Kim Tuttle
Wildlife Biologist
NH Fish and Game
Nongame and Endangered Species Program
603-271-6544

-----Original Message-----
From: Jonathan Evans [mailto:JEvans@dot.state.nh.us]
Sent: Thursday, May 06, 2010 2:56 PM
To: cmartin@nhaudubon.org
Cc: Henderson, Carol; Tuttle, Kim
Subject: RE: FW: Walpole-Charlestown, 14747, Field Review (Bald Eagles)

Chris,

Thank you for providing the below information regarding potential Bald Eagle impacts. I noticed that you were under the impression that the areas highlighted on the sheet were our only wetland impacts. The map was developed for the purposes of identifying potential impacts to dwarf wedgemussel habitat and northeastern bulrush habitat. The entire project is expected to require approximately 1 acre of wetland impacts, most of which are associated with intermittent or perennial streams carrying water off the hillside to the east and beneath the existing corridor. So, the wetland impacts associated with the project will be those highlighted on the map as well as to those associated with intermittent and perennial streams and some forested wetlands to the east of the tracks.

Please note that there will be a substantial amount of clearing to the east of the tracks (on the hillside) along the southern 1/3 of the project and to some degree along the northern 1/3. Clearing to the west of the existing roadway will be mostly limited to the Meany's Cove area.

This is required as we need to first construct a new railroad adjacent to the existing tracks, relocate the railroad operations to the new track, remove the old track and then move the existing roadway. A set of plans showing this is available on the departments website at:
http://www.nh.gov/dot/projects/walpole14747/documents/plan_323_pim2.pdf.
The areas on this plan highlighted in green indicate areas of slope work which will require clearing.

Do your records indicate the presence of any documented nesting or roosting trees which may potentially impacted by the proposed project.
I realize that this is a rather difficult assessment to make from the office. If this is the case, we will be conducting a field visit on May 18th which I welcome you to attend. I am unsure if Kim will be attending, but if she is, she may also be able to offer her advice.

Thank you again for your assistance.

Sincerely,
Jon Evans
~~~~~~~~~~~

Jonathan Evans
Senior Environmental Manager
NH Department of Transportation
Bureau of Environment
Phone: (603)271-4048
Fax:(603)271-7199

-----Original Message-----
From: Henderson, Carol [mailto:Carol.Henderson@wildlife.nh.gov]
Sent: Thursday, May 06, 2010 1:52 PM
To: Jonathan Evans
Subject: FW: FW: Walpole-Charlestown, 14747, Field Review

Hi Jon:

FYI

Carol Henderson
NH Fish and Game Department
11 Hazen Drive, Concord, NH 03301
603-271-3511
carol.henderson@wildlife.nh.gov
-----Original Message-----
From: Tuttle, Kim
Sent: Thursday, May 06, 2010 1:16 PM
To: Henderson, Carol
Subject: FW: FW: Walpole-Charlestown, 14747, Field Review

FYI. Kim

-----Original Message-----
From: Christian Martin [mailto:CMartin@NHAudubon.org]
Sent: Thursday, May 06, 2010 11:16 AM
To: Tuttle, Kim
~~~~~~~~~~~

Subject: Re: FW: Walpole-Charlestown, 14747, Field Review

Kim -

The area is within (but not at the core of) an documented active bald eagle breeding territory. The pair has nested at several different locations (all in VT) for 6 consecutive years since 2005. If the impacts to wetlands are truly limited to just the 3 spots described (limited encroachment at Jabes, Meany N, and Meany S wetlands), then there should be no issues for bald eagles.

As usual, my biggest concerns are that large dbh perch/roost/potential nest trees are preserved in all cases.

Please let me know if this is sufficient detail, or if I can offer any more info that would assist.

- Chris

Chris Martin, Senior Biologist, Conservation Department New Hampshire Audubon, 3 Silk Farm Road, Concord, NH 03301

Phone: 603/224-9909 x317; Fax: 603/226-0902;
E-mail: cmartin@nhaudubon.org; Web: www.nhaudubon.org

New Hampshire Audubon -- Protecting New Hampshire's natural environment for wildlife and for people.

>>> "Tuttle, Kim" <Kim.Tuttle@wildlife.nh.gov> 05/04/2010 11:22 AM >>>
Any eagle issues here? Big road realignment along the Connecticut River.

_____

From: Jonathan Evans [mailto:JEvans@dot.state.nh.us]
Sent: Tuesday, May 04, 2010 7:54 AM
To: Tuttle, Kim
Cc: Henderson, Carol
Subject: RE: Walpole-Charlestown, 14747, Field Review

Hi Kim,

Attached are both NHNHB checks (2007 & 2009). I have also attached my most recent correspondence with Susi as well as the information which I provided to her for her determination. She indicated that she did not feel that the project would impact any suitable dwarf wedgemussel habitat.

Please let me know if you have any other questions.

-Jon
~~~~~~~~~~~~

Jonathan Evans
Senior Environmental Manager
NH Department of Transportation
Bureau of Environment
Phone: (603)271-4048
Fax:(603)271-7199
~~~~~~~~~~~~

-----Original Message-----
From: Tuttle, Kim [mailto:Kim.Tuttle@wildlife.nh.gov]
Sent: Monday, May 03, 2010 3:32 PM
To: Jonathan Evans
Subject: FW: Walpole-Charlestown, 14747, Field Review

Jon,

Is there a NHB file number for this one? For some reason, I have a very hard time querying for jobs in multiple towns on the Data Base Check Tool.

Thanks,
Kim
Kim Tuttle
Wildlife Biologist
NH Fish and Game
Nongame and Endangered Species Program
603-271-6544

From: Henderson, Carol
Sent: Friday, April 30, 2010 9:43 AM
To: Tuttle, Kim
Subject: RE: Walpole-Charlestown, 14747, Field Review

That was what I told them as well. Yes, I plan on attending and I have invited Gabe as well for a fisheries perspective.

Carol Henderson

NH Fish and Game Department

11 Hazen Drive, Concord, NH 03301

603-271-3511

carol.henderson@wildlife.nh.gov
<mailto:carol.henderson@wildlife.nh.gov>

From: Tuttle, Kim

Sent: Friday, April 30, 2010 9:07 AM
To: Henderson, Carol
Subject: RE: Walpole-Charlestown, 14747, Field Review

It is probably a must that the USFWS be present as it is federally endangered species and we usually follow their lead on the project. Are you planning to attend?

Kim

From: Henderson, Carol
Sent: Thursday, April 29, 2010 2:06 PM
To: Tuttle, Kim
Subject: FW: Walpole-Charlestown, 14747, Field Review

Kim:

Please see e-mail below. This field visit is to review the potential impacts to the dwarf wedge mussel. USFWS have been invited in attending, would you be interested as well?

Carol Henderson

NH Fish and Game Department

11 Hazen Drive, Concord, NH 03301

603-271-3511

carol.henderson@wildlife.nh.gov
<mailto:carol.henderson@wildlife.nh.gov>

From: Jonathan Evans [mailto:JEvans@dot.state.nh.us]
Sent: Thursday, April 29, 2010 1:27 PM
To: Rich Roach (E-mail); Jamie Sikora (E-mail); Mark Kern (E-mail); Gino Infascelli (E-mail); Lori Sommer (E-mail); Henderson, Carol; Melissa L. Coppola (E-mail); Sussana von Oettingen (E-mail)
Cc: Kevin Nyhan; Charles Willeke; Donald Lyford; Wendy Johnson
Subject: Walpole-Charlestown, 14747, Field Review

All,

As was discussed at the April Natural Resource Agency Coordination Meeting, I would like to set up a field review of the
Walpole-Charlestown NH Route 12 reconstruction project. In the
interest of keeping the project moving I would like to shoot for sometime in early to mid May. I anticipate that we would leave Concord at approximately 9AM and return no later than 3PM. Please let me know if you would like to attend this field review and if so, your availability during this time frame.

Thank you for your assistance.

-Jon
~~~~~~~~~~~~

Jonathan Evans
Senior Environmental Manager
NH Department of Transportation
Bureau of Environment
Phone: (603)271-4048
Fax:(603)271-7199
~~~~~~~~~~~~

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 COMMERCIAL STREET, SUITE 300
CONCORD, NH 03301
PHONE: (603)223-2541 FAX: (603)223-0104
URL: www.fws.gov/newengland

Consultation Code: 05E1NE00-2016-SLI-0800 January 15, 2016
Event Code: 05E1NE00-2016-E-01063
Project Name: Walpole-Charlestown 14747

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Walpole-Charlestown 14747

Official Species List

Provided by:

New England Ecological Services Field Office
70 COMMERCIAL STREET, SUITE 300
CONCORD, NH 03301
(603) 223-2541
http://www.fws.gov/newengland

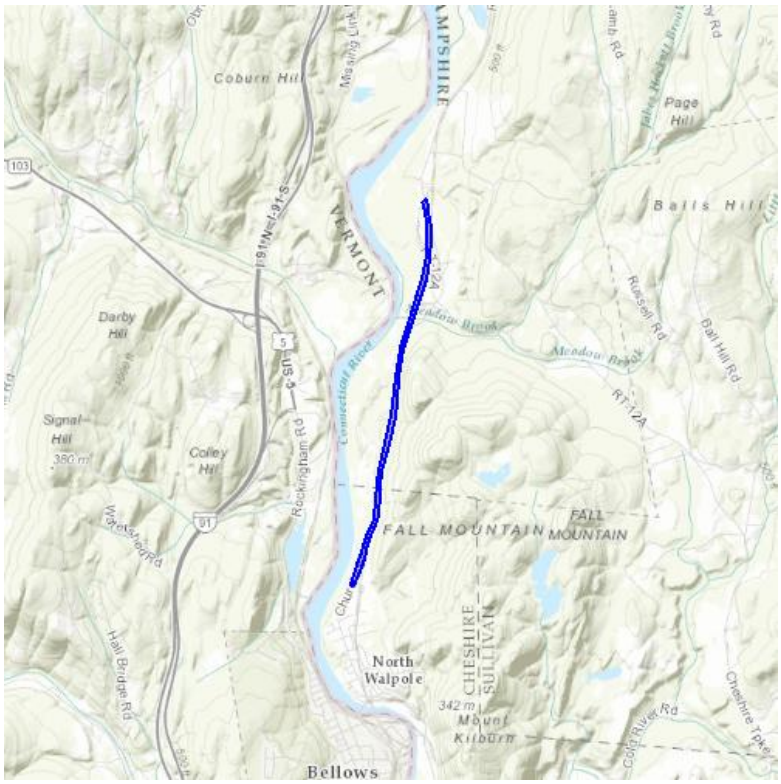
Consultation Code: 05E1NE00-2016-SLI-0800
Event Code: 05E1NE00-2016-E-01063

Project Type: TRANSPORTATION

Project Name: Walpole-Charlestown 14747
Project Description: This project involves the reconstruction and associated improvements to NH Route 12 beginning at Main Street in North Walpole, continuing to NH Route 12A in Charlestown. The project proposes to widen NH Route 12 and may require realignment of some portions of the New England Central Railroad. The project is approximately 4.5 km in length. The project will require clearing of trees, including trees with diameters larger than 3" at breast height.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Cheshire, NH | Sullivan, NH

Endangered Species Act Species List

There are a total of 3 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Clams	**Status**	**Has Critical Habitat**	**Condition(s)**
Dwarf wedgemussel *(Alasmidonta heterodon)* Population: Entire	Endangered		
Flowering Plants			
Northeastern bulrush *(Scirpus ancistrochaetus)*	Endangered		
Mammals			
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

CHH CHH SAE JAR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

March 19, 2007

Reference:	Project	Location
	Road reconstruction	Walpole, Charlestown, NH 14747, X-A000(487)

Jonathan Evans
NH Dept. of Transportation
P.O. Box 483
Concord, NH 03302-0483

Dear Mr. Evans:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the proposed activity(ies) referenced above.

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Anthony P. Tur
Endangered Species Specialist
New England Field Office

Jonathan Evans

From: Susi_vonOettingen@fws.gov
Sent: Monday, May 03, 2010 11:20 AM
To: Jonathan Evans
Cc: Rich Roach (E-mail); Melissa L. Coppola (E-mail); SCairns@dred.state.nh.us
Subject: RE: Walpole-Charlestown 14747 LCHIP and NHNHB/USF&WS Field Review

Hi Jon,

Thanks for sending me more information on the potential wetland impacts from the reconstruction of Rt. 12 in Walpole. I don't think dwarf wedgemussels will be an issue, the habitat clearly is not DWM habitat. However, there is a possibilitity that the Northeastern bulrush could be present in Meany Cove, I base this on the locality, (i.e. very close to known sites) and the habitat as shown in the photos (it looks like there are some other rush species in the photos). I believe that Meany Cove was surveyed in 1993 and no plants were found. However, I don't know how much of the cove was surveyed and if water levels were optimal for finding this species. The report I have doesn't go into great detail about sites that were surveyed and no plants were found. As a first step, a habitat review should be conducted to see if other species that are generally associated with the bulrush are present (is there a "sedge meadow") and and an idea of where to focus survey efforts could be developed. If suitable habitat is present, then Meany's Cove should be surveyed in August to determine whether the bulrush is present.

I do not believe that there is suitable habitat at the fill area of Jacob's Meadow, I've never seen the bulrush in riprap. What I don't know is how the rest of the wetland would be affected by the fill. If there is a potential that the hydrology of that wetland would be affected, then it should also be surveyed for the suitable bulrush habitat. If the hydrology is not anticipated to change, then no further surveys are required at this point for the Jacob's Meadow wetland.

NHNHB may have more information in there files regarding the Meany Cove site, I don't think that Jacob's Meadow was previously surveyed, but I'm not sure.

A site visit this early in the season may not be sufficiently informative to tell us whether or not we need to survey later in the season. Melissa and Sara what do you think? If you think it is worthwhile, I will try to make the field trip, but will drive separately and limit my review to those two wetlands.

Susi
~~~~~~~~~~~~~~~~~~~~~~~~~~
Susi von Oettingen
Endangered Species Biologist
US Fish and Wildlife Service
70 Commercial St., Suite 300
Concord, NH 03301
603-223-2541 ext. 22
603-491-8219 (cell)
http://www.fws.gov/newengland
~~~~~~~~~~~~~~~~~~~~~~~~~~

Jonathan Evans

From: Susi_vonOettingen@fws.gov
Sent: Friday, September 17, 2010 8:44 AM
To: Jonathan Evans
Cc: mcoppola@dred.state.nh.us
Subject: RE: Walpole-Charlestown 14747 - NH Route 12, LCHIP, Fall Mountain State Forest

Hi Jon,

Thank you for providing the information regarding the LCHIP property and the Northeastern bulrush survey. Based on the survey results, no further consultation is necessary since there are no federally listed species that may be affected by the project. If you need a letter stating this, please send me a request. Otherwise, I would consider this email sufficient for the administrative record.

Please call or email if you need further assistance.

Susi von Oettingen

~~~~~~~~~~~~~~~~~~~~~~~~~~
Susi von Oettingen
Endangered Species Biologist
US Fish and Wildlife Service
70 Commercial St., Suite 300
Concord, NH 03301
603-223-2541 ext. 22
603-491-8219 (cell)
http://www.fws.gov/newengland

"Jonathan Evans" <JEvans@dot.state.nh.us>

09/10/2010 11:57 AM

To "Bob Spoerl" <Robert.Spoerl@dred.state.nh.us>, "Krista Helmboldt (E-mail)" <khelmboldt@TNC.ORG>, "Bill Carpenter" <Bill.Carpenter@dred.state.nh.us>, "Sussana von Oettingen (E-mail)" <susi_vonoettingen@fws.gov>
cc "Melissa L. Coppola (E-mail)" <mcoppola@dred.state.nh.us>, "Aaron Ferraro (E-mail)" <aferraro@lchip.org>
Subject RE: Walpole-Charlestown 14747 - NH Route 12, LCHIP, Fall Mountain State Forest

All,

I wanted to provide all of you with an update on the status of the proposed LCHIP property acquisition in Charlestown. As you may remember this property is part of the Fall Mountain State Forest; of which interior portions are known to contain the northeastern bulrush.

Deb Turcott-Young recently left LCHIP and Aaron Ferraro recently joined LCHIP. Aaron is trying to get up to speed on this project and the proposed impacts to the Fall Mountain State Forest. As I indicated previously, the hearing was held on July 29. We are planning on presenting the project at the September 20, 2010 meeting of
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the LCHIP Board of Directors for a decision on the proposed LCHIP impacts. This meeting will be at the NH Office of Energy and Planning sometime between 10AM and noon. If any of you would like to attend this meeting that would be great, but not required. Please let me know if you plan to attend so I can give you a more definitive time once I have it. Once we have the Board's decision we can begin working on the property appraisal and the final compensation package.

Melissa Coppola and I reviewed the entire project area on Wednesday Sept. 1, 2010 for the presence of the northeastern bulrush. During this review Melissa did not find this species to be present within any areas that will be impacted by the project. She indicated that there is a possibility that the bulrush is located in unaffected portions of the wetlands adjacent to the project area, but again, no occurrences of the bulrush were found within the wetland areas that will be impacted by this project.

Should you have any questions, please feel free to let me know.

-Jon
~~~~~~~~~~~
Jonathan Evans
Senior Environmental Manager
NH Department of Transportation
Bureau of Environment
Email: jevans@dot.state.nh.us
Phone: (603)271-4048
Fax:(603)271-7199
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Matt Lundsted

From: Evans, Jonathan <Jonathan.Evans@dot.nh.gov>
Sent: Wednesday, March 15, 2017 7:42 AM
To: Matt Lundsted
Subject: FW: Walpole-Charlestown, 14747 - EFH assessment worksheet
Attachments: Walpole-Charlestown, 14747 - EFH Cover Letter.pdf; 2017 EFH Assessment Worksheet.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Matt,

Please see below regarding EFH. I have also attached the original cover letter and EFH assessment that was sent NOAA.

-Jon
~~~~~~~~~~~~

Jonathan Evans, Air & Noise Program Manager
NH Department of Transportation, Bureau of Environment
7 Hazen Dr., PO Box 483, Concord, NH 03302-0483
Email: Jonathan.Evans@dot.nh.gov
Phone: (603)271-4048 M-F 7AM-3PM

From: Mike R Johnson - NOAA Federal [mailto:mike.r.johnson@noaa.gov]
Sent: Tuesday, March 07, 2017 8:59 AM
To: Evans, Jonathan
Cc: Sikora, Jamie (FHWA)
Subject: Re: Walpole-Charlestown, 14747 - EFH assessment worksheet

Jon,

Based upon the information in the EFH assessment, we have determined that the proposed project would have minimal adverse effect on EFH for Atlantic salmon. In addition, the project area will have minimal effects on other NOAA-trust resources, including those covered under the Fish and Wildlife Coordination Act. Therefore, we have no EFH conservation recommendations to provide to you for this action pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Act.

Thanks,

Mike

On Thu, Mar 2, 2017 at 2:48 PM, Evans, Jonathan <Jonathan.Evans@dot.nh.gov> wrote:

Mike,

Please find the attached cover letter, and EFH assessment worksheet for a proposed project along NH Route 12 in the Towns of Walpole and Charlestown NH. This project will require impacts within the Connecticut River which has been designated an EFH for Atlantic Salmon. The Department previously coordinated with your office regarding a somewhat different project design for this area back in 2010 but that was subsequently altered
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due to unforeseen circumstances. As such, I have also attached the 2010 EFH assessment and response from your office for your reference.

Please let me know if you have any questions. I look forward to your response.

Sincerely,

Jon Evans

~~~~~~~~~~~~
Jonathan Evans, Air & Noise Program Manager
NH Department of Transportation, Bureau of Environment
7 Hazen Dr., PO Box 483, Concord, NH 03302-0483
Email: Jonathan.Evans@dot.nh.gov
Phone: (603)271-4048 M-F 7AM-3PM

--
Michael R. Johnson
U.S. Department of Commerce
NOAA Fisheries
Greater Atlantic Regional Fisheries Office
(formerly, Northeast Regional Office)
Habitat Conservation Division
55 Great Republic Drive
Gloucester, MA 01930
978-281-9130
mike.r.johnson@noaa.gov
http://www.greateratlantic.fisheries.noaa.gov/


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THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

Victoria F. Sheehan
Commissioner

William Cass, P.E.
Assistant Commissioner

March 2, 2017

Mr. Mike Johnson
Marine Habitat Resource Specialist
Habitat Conservation Division, NOAA Fisheries
US Department of Commerce, Northeast Regional Office
55 Great Republic Drive
Gloucester, MA 01930

RE: Walpole-Charlestown, X-A000(487), 14747
NH Route 12 Reconstruction

Dear Mr. Johnson:

The New Hampshire Department of Transportation (NHDOT), together with the Federal Highway Administration (FHWA), is proposing the widening and reconstruction of approximately 2.7 miles of NH Route 12 between Main Street in North Walpole, NH and NH Route 12A in Charlestown, NH. The purpose of this effort is to address the existing safety issues associated with this narrow, substandard section of roadway as well as to address stability issues associated with the roadway/Connecticut River embankments within the project area, particularly within the southern portion of the project.

In 2010 the Department prepared and reviewed with NOAA Fisheries an Essential Fish Habitat (EFH) assessment worksheet for a design which involved an eastward shift of the roadway and the adjacent railroad. Although this design largely shifted the roadway away from the Connecticut River it still required minor impacts to several backwater areas of this resource. NOAA Fisheries indicated on June 7, 2010 that there were no concerns with the project as proposed and EFH conservation recommendations would not be required.

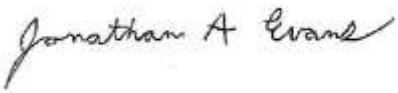
Subsequent to the Department's coordination with NOAA Fisheries in 2010, it was determined through further design that the eastward shift in the alignment of the roadway was no longer a viable option due to the excessive costs and the lengthy duration of construction necessary to remove a large quantity of rock to the east of the adjacent active railroad. Through extensive coordination with the FHWA, the various natural resource agencies and the general public, the Department has since revised the proposed design to include a slight westward shift in the alignment of the roadway so as to avoid impacting the railroad and the adjacent rock slopes. This westward alignment shift will, address the roadway's existing safety issues, reconstruct the failing slopes adjacent to the Connecticut River, limit the duration of construction and is anticipated to remain within the project budget.

Due to the proposed design changes, the Department has prepared the attached updated EFH assessment worksheet on behalf of the FHWA in order to assess the potential effects of this project on the Connecticut River Atlantic salmon (*Salmo salar*) EFH. Based upon the information in this EFH assessment worksheet, it appears that the proposed project would have minimal adverse effect on this

Atlantic salmon EFH. In addition, the project area is anticipated to have minimal or no effects on other NOAA-trust resources, including those covered under the Fish and Wildlife Coordination Act. Pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Act, please provide any EFH conservation recommendations that NOAA Fisheries may have.

Please contact me should you have any questions or require any additional information.

Sincerely,



Jonathan Evans
Air & Noise Program Manager
NHDOT Bureau of Environment
Email: Jonathan.Evans@dot.nh.gov
Phone: (603)271-4048

JAE:jae
Enc.
cc Jamison Sikora, FHWA

s:\environment\projects\walpole\14747\efh\walpole-charlestown, 14747 - efh cover letter.docx

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES (modified 3/2016)

PROJECT NAME:

DATE:

PROJECT NO.:

LOCATION (Water body, county, physical address):

PREPARER:

Step 1: Use the Habitat Conservation Division EFH webpage's Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest (http://www.greateratlantic.fisheries.noaa.gov/hcd/index2a.htm). Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. The list can be included as an attachment to the worksheet. Make a preliminary determination on the need to conduct an EFH consultation.

1. INITIAL CONSIDERATIONS		
EFH Designations	**Yes**	**No**
Is the action located in or adjacent to EFH designated for eggs? List the species:		
Is the action located in or adjacent to EFH designated for larvae? List the species:		
Is the action located in or adjacent to EFH designated for juveniles? List the species:		
Is the action located in or adjacent to EFH designated for adults or spawning adults? List the species:		
If you answered no to all questions above, then EFH consultation is not required - go to Section 5. If you answered yes to any of the above questions proceed to Section 2 and complete remainder of the worksheet.		

Step 2: In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Identify the sources of the information provided and provide as much description as available. These should not be yes or no answers. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts. Project plans that show the location and extent of sensitive habitats, as well as water depths, the HTL, MHW and MLW should be provided.

2. SITE CHARACTERISTICS

Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	
What are the sediment characteristics?	
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the SAV species and spatial extent.	
Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.	
Is there shellfish present at or adjacent to the project site? If so, please describe the spatial extent and species present.	
Are there mudflats present at or adjacent to the project site? If so please describe the spatial extent.	
Is there rocky or cobble bottom habitat present at or adjacent to the project site? If so, please describe the spatial extent.	
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so for which species, what type habitat type, size, characteristics?	
What is the typical salinity, depth and water temperature regime/range?	
What is the normal frequency of site disturbance, both natural and man-made?	

What is the area of proposed impact (work footprint & far afield)?	

<u>Step 3</u>: This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS

Impacts	Y	N	Description
Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.			
Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.			
Will SAV be impacted? If no, why not? If yes, describe in detail how the SAV will be impacted. Consider both direct and indirect impacts. Provide details of any SAV survey conducted at the site.			
Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?			
Will mudflat habitat be impacted? If no, why not? If yes, describe in detail how mudflats will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?			
Will shellfish habitat be impacted? If so, provide in detail how the shellfish habitat will be impacted. What is the aerial extent of the impact?			

Provide details of any shellfish survey conducted at the site.			
Will hard bottom (rocky, cobble, gravel) habitat be impacted at the site? If so, provide in detail how the hard bottom will be impacted. What is the aerial extent of the impact?			
Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.			
Will turbidity increase? If no, why not? If yes, describe the causes, the extent of the effects, and the duration.			
Will water depth change? What are the current and proposed depths?			
Will contaminants be released into sediments or water column? If yes, describe the nature of the contaminants and the extent of the effects.			
Will tidal flow, currents, or wave patterns be altered? If no, why not? If yes, describe in detail how.			
Will water quality be altered? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration of the impact.			
Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.			

Does the action have the potential to impact prey species of federally managed fish with EFH designations?			

Step 4: This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species (from the list generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage (http://www.greateratlantic.fisheries.noaa.gov/hcd/list.htm) should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and Values	**Y**	**N**	**Describe habitat type, species and life stages to be adversely impacted**
Will functions and values of EFH be impacted for:			
Spawning **If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**			
Nursery **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**			
Forage **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**			
Shelter **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**			

Will impacts be temporary or permanent? Describe the duration of the impacts.			
Will compensatory mitigation be used? If no, why not? Describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation plan, if applicable.			

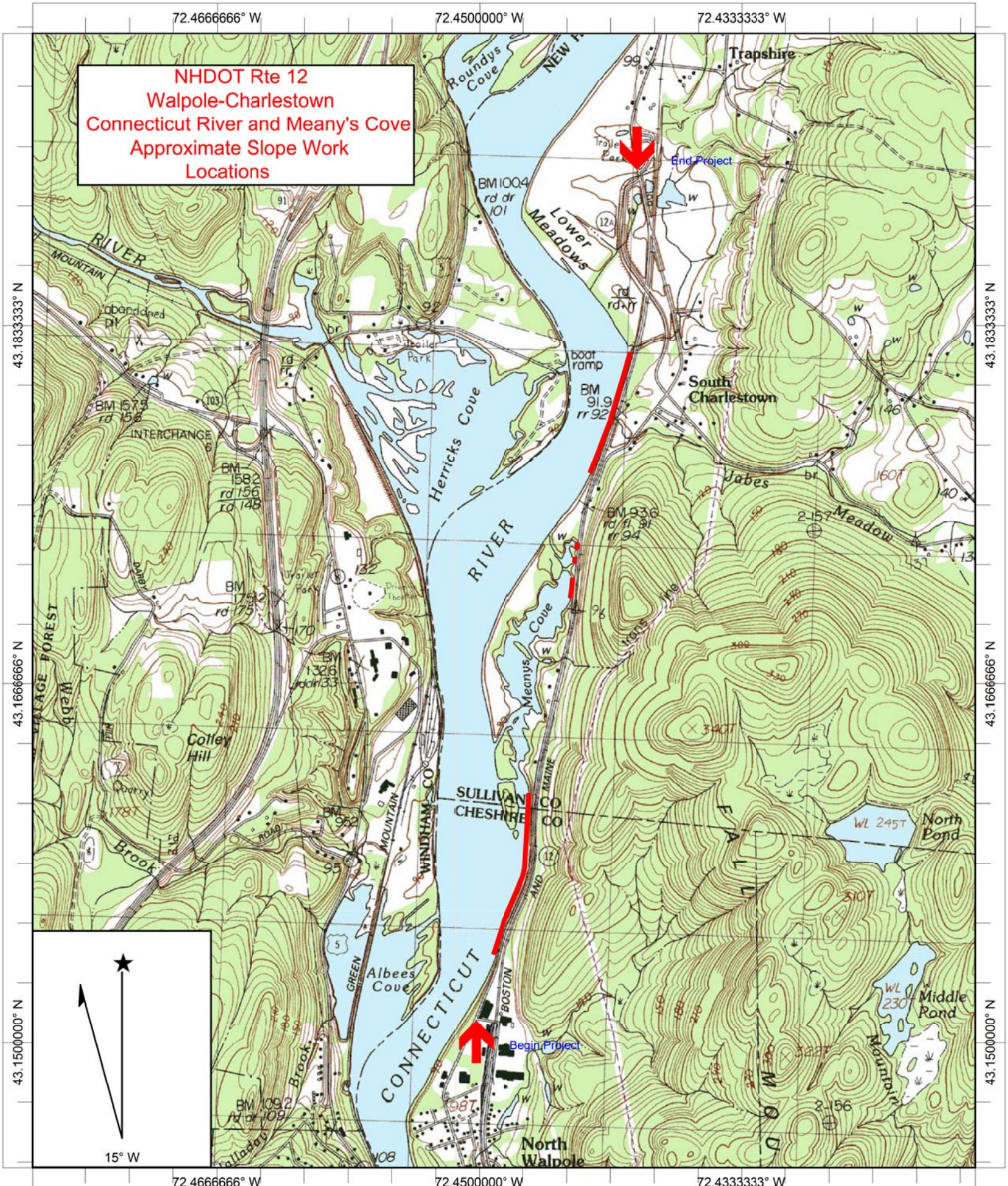
Step 5: This section provides the federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

Please note: if information provided in the worksheet is insufficient to allow NOAA Fisheries to complete the EFH consultation additional information will be requested.

5. DETERMINATION OF IMPACT		
	/	**Federal Agency's EFH Determination**
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: **(check the appropriate statement)**		**There is no adverse effect on EFH or no EFH is designated at the project site.** **EFH Consultation is not required**
		The adverse effect on EFH is not substantial. This means that the adverse effects are either no more than minimal, temporary, or that they can be alleviated with minor project modifications or conservation recommendations. **This is a request for an abbreviated EFH consultation.**
		The adverse effect on EFH is substantial. **This is a request for an expanded EFH consultation**

Step 6: Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats as part of the Fish and Wildlife Coordination Act Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT	
Species known to occur at site (list others that may apply)	**Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.**
alewife	
American eel	
American shad	
Atlantic menhaden	
blue crab	
blue mussel	
blueback herring	
Eastern oyster	
horseshoe crab	
quahog	
soft-shell clams	
striped bass	
other species:	



Name: BELLOWS FALLS
Date: 2/14/2007
Scale: 1 inch equals 2000 feet

Location: 043.1705589° N 072.4484471° W
Caption: Walpole-Charlestown, 14747, X-A000(487)

Matt Lundsted

From: Martin, Rebecca <Rebecca.Martin@dot.nh.gov>
Sent: Tuesday, November 29, 2016 1:16 PM
To: Evans, Jonathan
Subject: RE: Walpole-Charlestown, 14747 - Bats
Attachments: AppendixBProject SubmittalFormMay2016.pdf

Hello Jon,

Yes I believe you will be able to use the FHWA Programmatic Consultation.

I looked through the Walpole-Charlestown Survey Report and found that there was probable presence of NLEB reported from the acoustic analysis software. The potential MYSE calls (high frequency) were sent for qualitative analysis by Northern Stewards. Of the twenty-nine files resulted in no visual confirmation of MYSE. Therefore, in accordance with Step 7 of the USFWS Summer Survey Guidelines, no further surveys are needed. We consider this a Negative P/A survey.

The FHWA Programmatic Consultation covers projects that are:

- Transportation activities > 0.5 miles of NLEB hibernacula
- All tree removal is >0.25 miles from NLEB roosts
    - The list I have from NH F&G does not include NLEB hibernacula or roost trees in Walpole or Charlestown- so as long as NLEB did not show up in your NHB search, you are all set.
- Within 300 feet of existing road/rail surfaces, unless negative P/A survey- which you have if the new project area is the same or within the boundaries of the old project.

I looked at the BO and the wording is that the Programmatic Consultation covers "Transportation activities >0.5 miles from a Indiana bat and/ or NLEB hibernaculum AND within 300 feet (ft.) of existing road/rail surfaces" with few exceptions. So it seems that project activities (not clearing) must be within 300' unless negative P/A survey.

I should mention in case this applies to future projects- that the BO does cover a limited set of transportation activities >0.5 miles from a NLEB hibernaculum that are outside 300 ft. of existing road/rail surfaces that:
o Have **negative** presence/absence (P/A) summer surveys;
o Involve maintenance of existing facilities (e.g., rest areas, stormwater detention basins) (no new ground disturbance and no tree removal);
o Involve wetland or stream protection activities associated with compensatory wetland mitigation without any suitable habitat clearing; or
o Involve slash pile burning.

Since there was a negative result to the acoustic survey, if the project area is the same as what was originally surveyed (or shorter), you can fill out the Project Submittal Appendix B as NLAA: NLAA – project(s) are inside the range and suitable bat habitat is present, but negative bat presence/absence (P/A) surveys; must also be greater than 0.5 miles from any hibernaculum. As you will notice on the Project Submittal Appendix B this category indicates NLAA without AMMs. However, I think this was an oversight because the following AMMs are listed as required (one of the inconsistencies I mentioned):

General AMM 1. Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all Transportation Agency environmental commitments, including all applicable AMMs.

Tree Removal AMM 3. Ensure tree removal is limited to that specified in project plans. Install bright

colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits. Ensure that contractors understand clearing limits and how they are marked in the field

Tree Removal AMM 4. Do not cut down documented Indiana bat or NLEB roosts (that are still suitable for roosting) (or trees within 0.25 miles of roosts) or documented foraging habitat any time of year.

AMM 5 and AMM6 only apply to Indiana Bat.

If you have a consultation code from IPaC you can complete the Appendix B (I can help, if you have questions) as NLAA and submit to USFWS. After 14 days you can assume concurrence.

If the project is not within the bounds of the acoustic survey, since all project activities are within 300', the project will still be covered under the FHWA Programmatic Consultation. If they want to clear during the summer, the project would be a LAA project. The same Appendix B will be completed as LAA, but this will require a USFWS response (30 days).

Thank you for checking on the NLEB! Please let me know if you have any questions.

Rebecca Martin
Environmental Manager
NH DOT Bureau of Environment
7 Hazen Drive
Concord, NH 03302
(603)271-6781
Rebecca.Martin@dot.nh.gov

From: Evans, Jonathan
Sent: Monday, November 28, 2016 2:14 PM
To: Martin, Rebecca
Subject: FW: Walpole-Charlestown, 14747 - Bats

Rebecca,

As a follow up to our conversation earlier, all work for the subject project will be located within 300' of the existing roadway and preliminary clearing estimates are around 4.5 acres and are not expected to change much if at all, so they should be well below the 20 acre limit we discussed.

So, based upon this as well as your review of the previous investigations and check on whether or not the area has any known hibernacula/roosting trees, please let me know if you think this project can be covered under FHWA's programmatic consultation process.

Again, no big rush, whenever you get a chance to take a look is fine. Thanks!

-Jon

From: Fifield, Samantha
Sent: Monday, November 28, 2016 1:50 PM
To: Evans, Jonathan
Subject: RE: Walpole-Charlestown, 14747 - Bats

Hi Jon,

To answer the questions below:

1) No; work will most definitely be located within 300 feet of the existing roadway.
2) No; the preliminary quantity calculation for clearing is at 4.5 AC and I seriously doubt that that quantity will jump by over 400% of the prelim quantity.

It's nice to know that at least one issue may go away☺

Please do not hesitate to let me know if you need more information.

Best regards,
Sam

From: Evans, Jonathan
Sent: Monday, November 28, 2016 1:34 PM
To: Fifield, Samantha
Subject: Walpole-Charlestown, 14747 - Bats

Sam,

After I talked to you earlier, I also went to see Maggie to make sure she didn't have any additional questions regarding the wetland permitting. That prompted the e-mail she recently sent to Don. She also asked me about the bats. Since it has been a while since I thought about that I needed to refresh my memory on where we stood regarding bats and if the new project design will be an issue. I think the new project design will actually make the bat issue easier to deal with, but I need to know a few things:

1. Will there be any work greater than 300' from the existing roadway? I think the answer is no, but I just want to confirm?
2. Will there be more than 20 acres of clearing? Again, I think the answer is no, but I want to confirm.

If the answer is no to both of these, I think the bat issue is pretty much solved. If the answer is yes to either, I may need to do some additional coordination with US Fish and Wildlife if we want to clear during the non-winter months.

Thanks,
Jon
~~~~~~~~~~~~

Jonathan Evans, Air & Noise Program Manager
NH Department of Transportation, Bureau of Environment
7 Hazen Dr., PO Box 483, Concord, NH 03302-0483
Email: Jonathan.Evans@dot.nh.gov
Phone: (603)271-4048 M-F 7AM-3PM
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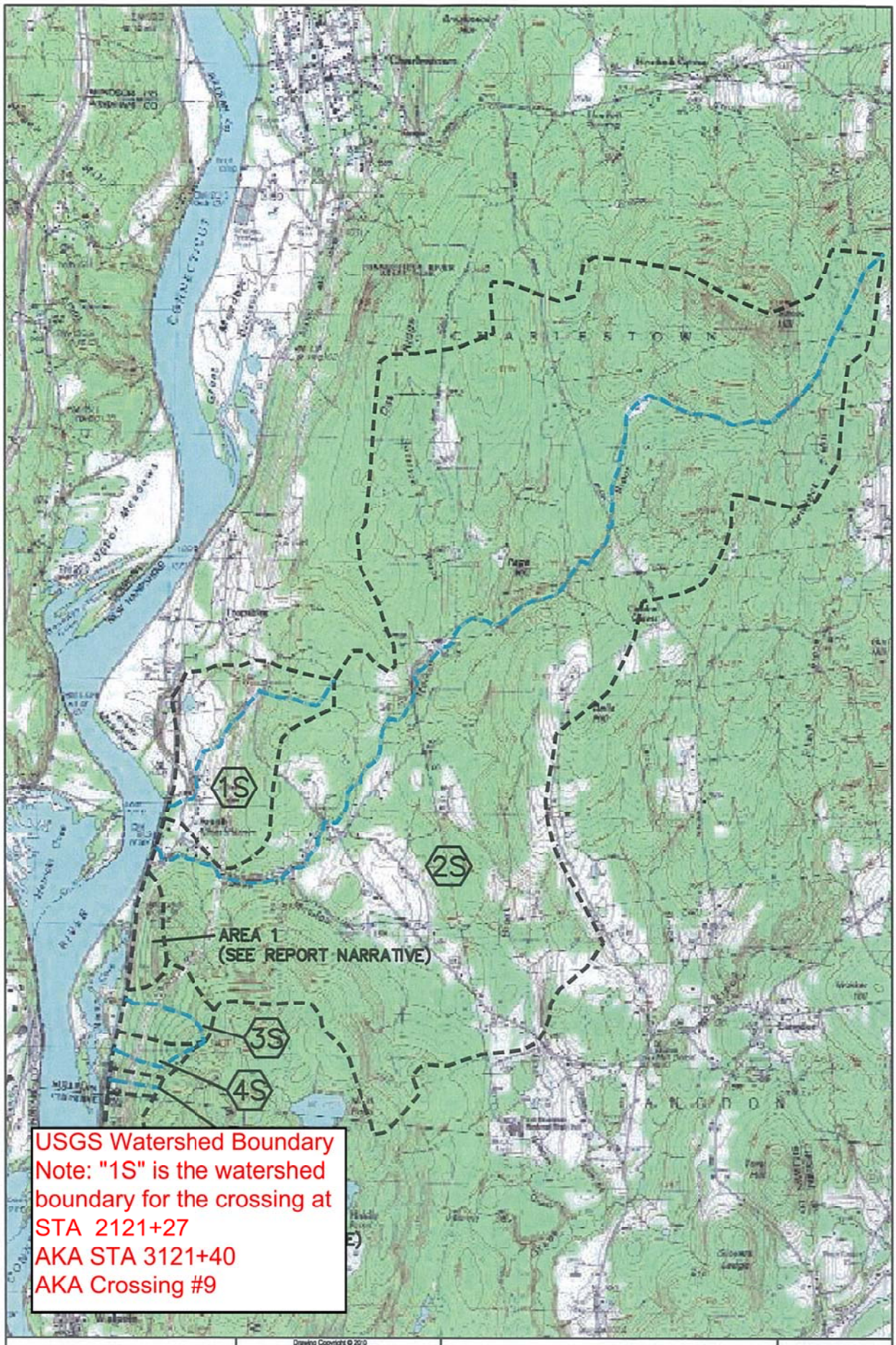
Appendix D USGS Watershed Boundaries for Stream Crossing



0 2400 4800
Scale in feet

CHA
11 King Court - Keene, NH 03431-4648
Main: (603) 357-3445 - www.chacompanies.com

OVERALL WATERSHED MAP
WALPOLE–CHARLESTOWN
NH ROUTE 12
STATE PROJECT #14747

PROJECT NO. 21730

DATE: 07/12/10

Attachment A

Appendix E Stream Crossing Documentation

NH Department of Transportation
Bureau of Environment
Walpole-Charlestown, #14747
STA 2121+27 (also referred to in documentation as STA 3121+40 or Crossing #9)
Env-Wt 904.09 Alternative Design
TECHNICAL REPORT

Env-Wt 904.09(a) - If the applicant believes that installing the structure specified in the applicable rule is not practicable, the applicant may propose an alternative design in accordance with this section.

Please explain why the structure specified in the applicable rule is not practicable (Env-Wt 101.69 defines practicable as *available and capable of being done after taking into consideration costs, existing technology, and logistics in light of overall project purposes.)*
An alternative design is requested for this crossing since a compliant structure consisting of a 14' (1.2 bankful width) wide clear span structure with natural substrate stream bottom is not feasible to build at this location due to the railroad, which must be actively maintained during construction. In order to accommodate the proposed widening of NH 12 to the west, the existing 66" diameter reinforced concrete pipe (RCP) will be replaced under existing NH 12 and extended in-kind by 6' with a new head wall and outlet protection (a total length of 50'). The documentation attached in Attachment B for a "Stream Crossing Alternative Design Station 3121+40" was originally compiled for a previous design option where a new railroad alignment was proposed to be built to the east while maintaining daily train traffic and enabling phased construction of the structure proposed in that report. The documentation is included as background information for the crossing location. That design option has been abandoned since the proposed construction costs of that option far exceeded the program and was deemed not feasible.

The proposed alternative meets the specific design criteria for Tier 2 and Tier 3 crossings to the *maximum extent practicable*, as specified below.

Env-Wt 904.05 Design Criteria for Tier 2 and Tier 3 Stream Crossings – New Tier 2 stream crossings, replacement Tier 2 crossings that do not meet the requirements of Env-Wt 904.07, and new and replacement Tier 3 crossings shall be designed and constructed:

(a) In accordance with the NH Stream Crossing Guidelines.
No replacement structure is proposed, the existing 66"diameter RCP will be replaced/extended in-kind with a new head wall and outlet protection.

(b) With bed forms and streambed characteristics necessary to cause water depths and velocities within the crossing structure at a variety of flows to be comparable to those found in the natural channel upstream and downstream of the stream crossing.
The existing 66"diameter RCP will be extended in-kind with outlet protection so existing flow characteristics (depths and velocities) will be maintained.

(c) To provide a vegetated bank on both sides of the watercourse to allow for wildlife passage.
Since the existing 66"diameter RCP will be extended in-kind with a new outlet protection, the 66" diameter is not wide enough to support banks within the structure for the estimated 10.3' (14', 1.2 bankful width) wide bankful width of the stream.

(d) To preserve the natural alignment and gradient of the stream channel, so as to accommodate natural flow regimes and the functioning of the natural floodplain.
The existing structure lacks adequate width to allow a natural alignment within the crossing but does accommodate the flow regimes and will not impact the existing floodplain conditions since the 100 year flood exceeds the road elevation at the location of this crossing due to its proximity to the Connecticut River. A compliant crossing would not change the 100 year flood elevation caused by the Connecticut River.

(e) To accommodate the 100-year frequency flood, to ensure that (1) there is no increase in flood stages on abutting properties; and (2) flow and sediment transport characteristics will not be affected in a manner which could adversely affect channel stability.
The 100 year flood exceeds the road elevation at the location of this crossing due to its proximity to the Connecticut River. A compliant crossing would not change the 100 year flood elevation caused by the Connecticut River. The flood stages on abutting properties and the flow and sediment transport capabilities will remain the same as the existing condition.

(f) To simulate a natural stream channel.
The size and elevation of the existing culvert does not lend itself to providing a natural stream channel within the culvert.

(g) So as not to alter sediment transport competence.
Since the existing 66"diameter RCP will be extended in-kind it is not expected to change the sediment transport competence of the existing structure.

Env-Wt 904.09(c)(3) – The alternative design must meet the general design criteria specified in Env-Wt 904.01:

Env-Wt 904.01
(a) Not be a barrier to sediment transport;
The existing crossing is a 66-inch diameter RCP will be replaced/extended in-kind so no change in velocity or sediment transport competence is anticipated.

(b) Prevent the restriction of high flows and maintain existing low flows;
The proposed 6' extension of the 66" will not substantially alter the existing channel cross-section or adjacent floodplain.

(c) Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction;
Aquatic life movements will not be permanently impacted by the proposed extension. The current conditions include a 66-inch diameter RCP, which is significantly smaller than the bankfull stream width of 10.3 feet. Aquatic organism passage will likely remain at the same level as provided by the existing structure.

(d) Not cause an increase in the frequency of flooding or overtopping of banks;
The extension of the culvert in-kind is not expected to affect the frequency of flooding or overtopping of banks beyond current conditions. The 100 year flood exceeds the road elevation at the location of this crossing due to its proximity to the Connecticut River. No reduction in the capacity of the existing culvert is proposed.

(e) Preserve watercourse connectivity where it currently exists;
The proposed replacement/extension of the crossing will maintain watercourse connectivity which currently exist.

(f) Restore watercourse connectivity where: (1) Connectivity previously was disrupted as a result of human activity(ies); and (2) Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both;
The existing culvert provides connectivity and its effectiveness is not expected to be impacted by the replacement/extension.

(g) Not cause erosion, aggradation, or scouring upstream or downstream of the crossing; and
Existing conditions are expected to be maintained.

(h) Not cause water quality degradation.
During construction, appropriate erosion and sedimentation controls will be used to protect the stream. Temporary water diversion will be according to the Department's standard water handling techniques and will be regularly monitored. Proper diversion methods, water handling, dewatering and erosion control measures will be implemented.

*****Note: An alternative design for <u>Tier 1</u> stream crossings must meet the general design criteria (Env-Wt 904.01) only to the *maximum extent practicable*.**

14747 Walpole-Charlestown

Stream Assessment Attachments

The memos and stream crossing assessment reports which follow are being provided to demonstrate the review, evaluation, and coordination that was completed to determine that the culvert crossing at STA 2121+27 (referred to in Attachment documentation as STA 3121+40 or Crossing #9) was the only stream crossing that was determined to be subject NH's Stream Crossings Rules (Env-Wt 901). The following attachments along with a brief explanation of their relevance is as follows:

- Meeting Memo dated September 18, 2013- *discusses the potential cross culverts and/or stream culverts which are impacted by the project;*
- Memo dated September 30, 2013- *follow-up regarding further field work to investigate crossing features- determined that remaining crossings were not subject stream crossing rules with the exception of Crossing #9;*
- Memo dated June 12, 2014 Revised September 23, 2015- *hydraulic and sizing memo regarding STA 2105+68 (referred to in Attachment documentation as STA 3105+75 or Crossing #8) as an equalization culvert between the Connecticut River and Jabes Meadow Brook;*
- Stream Crossing Alternative Design Technical Report STA 3121+40 dated DRAFT February 2015- *design and sizing summary for the recommended culvert for STA 2121+27 (referred to in Attachment documentation as STA 3121+40 or Crossing #9).*

MEETING MEMO

Attendees:	Peter Salo	NHDOT
	Samantha Fifield	NHDOT
	Don Lyford	NHDOT
	Matt Urban	NHDOT
	Gino Infascelli	NHDES
	Ted Setas	Jacobs
	Rebecca Balke	Comprehensive Environmental
	Scott Salvucci	Comprehensive Environmental

Notes by: Scott Salvucci

Subject: Walpole-Charlestown Preliminary Stream Crossing Assessment

Job No. 14747 CEI: 654-7

Meeting Date: 9/18/2013

Representatives from the New Hampshire Department of Transportation (NHDOT), New Hampshire Department of Environmental Services' (NHDES) representative Gino Infascelli, Jacobs' representative Ted Setas, and CEI's representatives Rebecca Balke and Scott Salvucci met in the NHDOT Lobby Conference Room to discuss preliminary stream crossing assessments along the Walpole-Charlestown NH Route 12 highway/railway corridor widening and realignment project.

The purpose of the meeting was to present our proposed approach to culvert design for the nine stream crossings in question and obtain feedback from NHDES before moving forward. CEI presented aerial overviews and field photos of the nine stream crossings to NHDES and NHDOT. The following summarizes the key discussions from the meeting:

- Determine whether existing/proposed culverts meet the purpose of the stream crossing rules (Env-Wt 901.01). If it does not/cannot (e.g., is a wetland ditch), then an argument can be made that the rules do not apply.
- NHDES agreed with CEI and NHDOT that crossings 1 through 4 appear to be drainage swales or ditches and/or do not meet the purpose of the rules, therefore are not subject to the stream crossing rules. These drainage crossings do not have stream attributes such as banks and sediment transport. Env-Wt 901.02(b) states the rules do not apply to crossings of drainage swales or ephemeral streams.
- Any drainage crossing located within a designated river corridor that is determined to be a stream crossing will require Tier 3 design compliance (Env-Wt 904.04). The rules do not provide provisions to otherwise classify these drainage crossings as Tier 1 or 2,

regardless of drainage area.

- Crossings 5 & 6 both have drop inlets. Crossing 6 may not meet the purpose of the stream crossing rules since it is only wet for 20' upgradient of the crossing and does not provide habitat. Further evaluation of crossings 5 and 6 will be performed to determine whether there is existing or opportunity to create connectivity to the Connecticut River. This will include review of the outlet side of the culvert and its elevation compared with the Connecticut River.
- Crossings 7 & 9 will require Tier 3 design compliance.
- NHDES agreed with CEI and NHDOT that crossing 8 acts as an equalization culvert. Stream characteristics of Jabe Meadow Brook do not extend to the culvert in question, therefore, this culvert is not subject to the stream crossing rules.
- Design considerations of crossing 8 will include compensatory storage for areas filled as part of the highway/railway corridor widening.
- Gino Infascelli suggested reviewing the Bellows Falls Dam historical data files and report by Trans Canada Hydro East to review historic water levels in the Connecticut River. These water elevations can be cross referenced with the inverts of the existing drainage and stream crossing culverts and may be helpful in supporting lack of connectivity.
- All Tier 3 designs shall comply with the stream crossing rules. Alternative designs may be required at some crossings if installing the structure specified by Tier 3 rules is not practicable.
- This project will be considered a major impact project.

Subsequent Items

- CEI will further investigate crossings 5 & 6 to determine stream connectivity to the Connecticut River. Field work and stream measurements will be based on this assessment.
- CEI will perform field work and stream measurements at crossings 7 & 9.
- A meeting with Natural Resources will be set up after preliminary field work, rather than waiting for permits or a separate meeting with NHDES. Receive feedback from Natural Resources prior to moving ahead with designs.
- Preliminary stream crossing designs will be presented to the railroad authorities for their review and input prior to final design.
- Temporary easements for dewatering may be required.

The above text summarizes the events of the meeting at the above date and time.
If this information is not correct, please contact me as soon as possible.

Crossings 1-9 Summary Table 9/18/2013 **SUPERSEDED**

Route 12 Highway/Railway Corridor Widening and Realignment Project - 14747

Crossing Number	Approximate Station Location	Existing Pipe Size & Type	Proposed Tier Classification	Drainage Area[+] (Acres)	Field Notes (November 7, 2011)
1	3015+30	24-inch CMP	Drainage Swale	< 80	Small deep valley; no visible water; no stream channel; leaf litter
2	3026+25	30-inch CMP	Drainage Swale	< 80	Fed by GW seeps; no stream channel; leaf litter
3	3031+00	30-inch Steel	Drainage Swale	< 80	Some visible water; intermittent; leaf litter; GW seeps
4	3039+75	15-inch VCP	Drainage Swale	< 80	Culvert not located; forest stream from utility easement; undefined stream flow through flat wetland; leaf litter, grassy shallow swamp
5	3045+60	18-inch CMP	Tier 1	18.0	Well defined stream; terminates in culvert under boards at RR tracks
6	3052+60	36-inch Metal	Tier 2	42.0	Mostly dry area; wet for last 20' at drop inlet; leaf litter, no visible stream sediments
7	3067+00	24-inch Stone Box into 36-inch RCP	Tier 3	88.0	Well defined stream; larger bankfull width than previous areas
8	3105+75	66" Concrete Box	Equalizing Culvert	4640	Major stream; impounded area; no defined stream channel to culvert
9	3121+40	66-inch RCP	Tier 3	356	Major stream crossing; recently cleaned; confining point in stream approx. 450' upstream of crossing

[+] Drainage area estimates provided by Preliminary Stormwater Management Report prepared by CHA

Crossings 1-9 Summary Table 9/18/2013 **REVISION NO. 1** **REVISION DATE: 9/20/13**

Route 12 Highway/Railway Corridor Widening and Realignment Project - 14747

Crossing Number	Approximate Station Location	Existing Pipe Size & Type	Proposed Tier Classification	Drainage Area (Acres)	Field Notes (November 7, 2011)	Next Steps (Per Meeting 9/18/13)
1	3015+30	24-inch CMP	Drainage Ditch	9.3	Small deep valley; no visible water; no stream channel; leaf litter	Drainage Design Only
2	3026+25	30-inch CMP	Drainage Ditch	7.9	Fed by GW seeps; no stream channel; leaf litter	Drainage Design Only
3	3031+00	30-inch Steel	Drainage Ditch	20.5	Some visible water; intermittent; leaf litter; GW seeps	Drainage Design Only
4	3039+75	15-inch VCP	Drainage Ditch	13.8	Culvert not located; forest stream from utility easement; undefined stream flow through flat wetland; leaf litter, grassy shallow swamp	Drainage Design Only
5	3045+60	18-inch CMP into 20-inch Metal	Alternative Design	11.1	Well defined stream; terminates in culvert under boards at RR tracks	Field Investigation
6	3052+60	24-inch Stone Box 36-inch Metal	Alternative Design	30.7	Mostly dry area; wet for last 20' at drop inlet; leaf litter, no visible stream sediments	Field Investigation
7	3067+00	24-inch Stone Box into 36-inch RCP	Alternative Design	75.8	Well defined stream; larger bankfull width than previous areas	Field Investigation
8	3105+75	66" Granite Box into 66" RCP	Equalizing Culvert	4573	Major stream; impounded area; no defined stream channel to culvert	Drainage Design Only
9	3121+40	66-inch RCP	Tier 3	634	Major stream crossing; recently cleaned; confining point in stream approx. 450' upstream of crossing	Field Investigation & Stream Measurements

MEMORANDUM

To:	File
From:	CEI
Subject:	Walpole-Charlestown Field Investigation
Job No.	14747 CEI: 654-7
Date:	9/30/2013

As a follow-up to a September 18, 2013 meeting with NHDOT and NHDES, CEI's Rebecca Balke and Scott Salvucci performed a field investigation at stream/drainage crossings 5 through 9 on September 25, 2013. Based on previous field investigations, which were presented at the meeting, it was determined that crossings 1-4 were drainage swales and hence not subject to NH's Stream Crossings Rules, however, further field investigation was needed to determine the applicability of these rules to crossings 5-7. The following bullet points detail the investigation findings and potential design considerations moving forward.

Field Investigations

Crossing #5 – Station 3045+60

- Upstream of the crossing there is a visible drainage ditch through the woods that appears to have been created through the erosive forces of stormwater runoff off the adjacent hillside. This scoured drainage ditch originates approximately 125 feet east of the railroad tracks, from beneath the roots of a tree adjacent to a cleared utility access way. The drainage ditch/extent of scouring does not cross the utility access way.
- The scoured ditch contained a few pockets of standing water in some low areas, but was otherwise not flowing.
- The proposed cross-sections in this area show a cut about 60 feet into the woods east of the railroad tracks to relocate the tracks. This cut will remove nearly half of the existing drainage ditch.
- The inlet end of the crossing is a visible corrugated metal pipe (CMP), somewhat misshapen/ crushed, approximately 18-inch diameter. It begins at the eastern edge of the tracks and the top of the pipe is a few inches below ground surface.
- The outlet end of the crossing is a 20-inch metal pipe with a concrete headwall.
- The downstream end of the crossing outlets from the side of the existing embankment. The outlet and receiving slope are protected with dumped riprap.
- There are no stream characteristics or banks visible on the outlet side of the culvert. When it rains, the flow is channelized down the steep slope and then appears to dissipate into the surrounding woods when it reaches flatter ground. No flow coming from the outlet of the pipe at the time of field investigation.

Crossing #6 – Station 3052+60

- Upstream of the crossing there is a visible scour path through the woods that appears to have been created from runoff coming off the adjacent hillside. This scour path originates approximately 100 feet east of the railroad tracks, from beneath what appears to be a manmade stone wall.
- The proposed cross-sections in this area show fill approximately 15 feet into the woods east of the railroad tracks. This fill will require an extension of the culvert crossing.

- The inlet end of the crossing is a drop inlet with bar grate into a 30-inch by 36-inch granite box. The drop into the box is approximately 3 to 4 feet down.
- There were pockets of standing water in low spots of the scoured path on the upgradient side. Otherwise, the path was relatively dry.
- The outlet end of the crossing is a 36-inch metal pipe with a concrete headwall. Two smaller pipes also discharge through the same headwall. The culvert crossing invert is raised about 10 inches off the ground surface.
- The downstream end of the crossing outlets at the woods floor. This area is proposed to be filled approximately 20 feet west towards the river. The culvert will need to be extended or replaced, based on further analysis during final design.
- There are no stream characteristics or banks visible on the outlet side of the culvert. When it rains, it appears the flow channelizes a short distance before dissipating into the surrounding woods. There was no flow coming from the outlet of the pipe at the time of field investigation.

Crossing #7 – Station 3067+00

- Upstream of the crossing there is a visible drainage ditch through the woods. This drainage ditch runs parallel to the railroad tracks along the bank of the existing railroad fill. Moving upstream, the drainage ditch then transitions into an eroded forest area with no banks but several trees with exposed roots. Further upstream the flow path transitions back to a shallow channel with small stones exposed throughout. Of the seven crossings (Crossings 1-7), this has the most defined channelization, however, it also has the largest contributing drainage area, resulting in the largest stormwater runoff flows.
- There were pockets of standing water in low spots of the scoured path on the upgradient side, in the immediate vicinity of the culvert crossing. Otherwise, the channel and surrounding area was dry.
- The inlet end of the crossing is a 2-foot by 2-foot stone box culvert. The culvert connects into a roadside catch basin and then outlets across the street.
- The outlet end of the crossing is a 36-inch reinforced concrete pipe (RCP) with a concrete headwall. The invert of the pipe is located about 10-inches above ground surface.
- The downstream end of the crossing outlets into a scoured pool of standing water, with exposed tree roots. This scour pool appears to have been created from flows discharging from the outlet and directed into an existing wooded slope. A channel then runs south, parallel to the roadway before it turns west toward the Connecticut River. This channel path runs around the wooded slope previously mentioned.
- The scoured flow path continues west into the woods for approximately 250 feet, decreasing in width and depth as it gets further away from the headwall. After this point there are no stream characteristics or banks visible. It appears any flow dissipates into the surrounding woods and there is no visible channelized connectivity with the Connecticut River. There was no flow coming from the outlet of the pipe at the time of field investigation.
- The proposed cross-sections in the area show a fill approximately 10 feet into the woods west of the roadway. This fill will remove a portion of the scour pool and the channel running parallel to the roadway. The proposed design should consider realigning the crossing with no structure turning points.

Crossing #8 – Station 3105+75

- Inlet end of the crossing is a granite box culvert. Approximately 66-inch by 66-inch, from field survey.
- The outlet end of the crossing is a 66-inch RCP with a concrete headwall. Concrete has broken away from the pipe end/ headwall, exposed rebar can be seen.
- The Walpole-Charlestown Stream Crossing #8 Assessment Memo dated September 10, 2013 describes the analysis for this crossing. An equalizing culvert between an existing ponded area/ wetlands and the Connecticut River.

Crossing #9 – Station 3121+40

- This crossing has the same pipe size and material at the inlet and outlet ends, 66-inch RCP with concrete headwalls.
- Stream flowing during time of investigation.
- The inlet end has created a ponded area, possibly due to an undersized culvert. The bankfull width at the downstream end is visibly smaller.
- The proposed cross-sections at the inlet end will fill approximately 20 feet into the ponded area to the east of the railroad tracks. The culvert will need to be extended or replaced, based on further analysis during final design.

Summary of Findings

Based on the September 25, 2013 field review, the following observations and conclusions were made:

1. Crossing 5 appears to be a drainage ditch created by the erosive forces of stormwater runoff coming off the adjacent hillside. There is no evidence of a stream and the downgradient side of the culvert dissipates into the woods, with no channelized connectivity to the Connecticut River. Based on these findings, CEI considers this crossing to represent a drainage swale not subject to NH's Stream Crossings Rules.
2. Crossing 6 appears to be a scoured drainage path created by stormwater from the adjacent hillside. There is no evidence of a stream and the downgradient side of the culvert dissipates into the woods, with no channelized connectivity to the Connecticut River. Based on these findings, CEI considers this crossing to represent a drainage swale not subject to NH's Stream Crossings Rules.
3. Crossing 7, while more channelized than crossings 5 and 6, appears to be a drainage ditch formed by stormwater runoff from the adjacent hillside. The outlet side is channelized for about 250 feet before it dissipates into the woods, with no channelized connectivity with the Connecticut River. Based on these findings, CEI considers this crossing to represent a drainage swale not subject to NH's Stream Crossings Rules.
4. As discussed at the September 18, 2013 meeting, crossing 8 is not subject to NH's Stream Crossings Rules since it acts as an equalization culvert.
5. Crossing 9 will be designed as a Tier 3 crossing.

MEMORANDUM

To:	Clinton Mercer & Aaron Seaman, Jacobs
From:	Matt Lundsted & Scott Salvucci, CEI
Subject:	Walpole-Charlestown Stream Crossing #8 Update
Job No.	654-7
Date:	June 12, 2014 Revised: September 23, 2015

The following is an update to the September 10, 2013 memo regarding the stream crossing assessment at "Crossing 8" (Station 3105+75 +/-) along the Walpole-Charlestown NH Route 12 highway/railway corridor widening and realignment project. New survey information has been acquired as well as as-built information in the area of the crossing. An existing transition of structure material and size located somewhere under the existing roadway has made it difficult to model and calculate the existing hydraulics. The new information does not confirm the exact size of the outlet portion of the crossing structure. Inverts in and out of the existing equalization culvert have been measured, however these inverts do not correlate directly with the size of openings recorded. The analysis performed for Crossing 8 has several assumption as detailed below.

The existing culvert acts as an equalization culvert between the existing ponded area/ wetlands and the Connecticut River. The intent of the proposed culvert replacement will be to mimic the existing flow conditions as seen in the existing equalization structure over various storm events. Greatly increasing the size of the culvert opening will alter the existing hydraulics and will allow equalization of the Connecticut River into the ponded area/ wetlands to occur more rapidly. Alternatively, greatly reducing the size of the culvert opening would delay the draining process of the ponded area/ wetlands after a flood event.

The 100-year flood event of the Connecticut River will completely submerge the existing culvert and inundate the roadway and railroad. With only the 100-year storm in mind the size of the culvert would become trivial due to the effects from the Connecticut River. However the sizing of the proposed culvert replacement will need to take into account various storm events as to not severely alter the existing hydraulics during smaller storm events. A culvert with similar flow characteristics, inlet and outlet types, and invert elevations will best suit the proposed conditions.

Based on the most recent survey and as-built plans of the culvert, the upstream end of the existing culvert is constructed of granite blocks with a natural bottom, 6'-6" wide by 13' high. A transition from granite blocks to a concrete pipe occurs in the vicinity of the halfway point through the culvert. The concrete pipe has been estimated as 8'-10" wide and 5'-6" high. The effective flow area within the culvert passing through the two different portions of pipe geometry and material is essentially reduced to a 6'-6" wide by 5'-6" high culvert.

The use of culvert embedment will have an effect on the proposed culvert final design. A concrete box culvert with flow area dimensions 6.5’ wide by 6’ high is recommended if the culvert will be embedded with a natural bottom of surrounding soils. If no culvert embedment is proposed a culvert with flow area dimensions 6.5’ wide by 5.5’ high is recommended. Attached at the end of this memo please find a culvert design form with rough calculations of the existing and proposed conditions. This form demonstrates the variation in flow and headwater elevations that occurs based on pipe geometry, manning’s n value and length.

As stated above the Connecticut River floodway of the 100-year storm submerges the existing culvert as well as inundates the existing roadway and railway. To maximize the usefulness of the proposed culvert and the storm events that will be regulated by the proposed culvert the proposed inverts should be set at elevations equal to the existing concrete culvert inverts. The concrete portion of the existing culvert is the smaller controlling constriction within the culvert. The downstream invert of the concrete culvert is at elevation 287.88 feet. A slope of 0.5% is proposed.

Headwalls on the upstream and downstream ends similar to the existing headwalls are recommended. The hydraulic capacity of the culvert will be affected based on the inlet type. Since this culvert acts as an equalization culvert both ends essentially act as inlet ends. According to Jacobs, rounded edges on the inlet will be provided to increase hydraulic efficiency of the structure, which aids in reducing the headwater elevation of the proposed conditions below the existing conditions.

Due to the need to extend the culvert to accommodate the proposed railway location, storage capacity provided by the existing ponded area/ wetlands was evaluated by Jacobs and found that compensatory storage will not be required under the proposed conditions.

PROJECT: Walpole-Charlestown Stream Crossing #8
NH Route 12

STATION: 3105+75

SHEET 1 OF 1

CULVERT DESIGN FORM

DESIGNER / DATE: SS / 9/23/15

REVIEWER / DATE: ML / 9/23/15

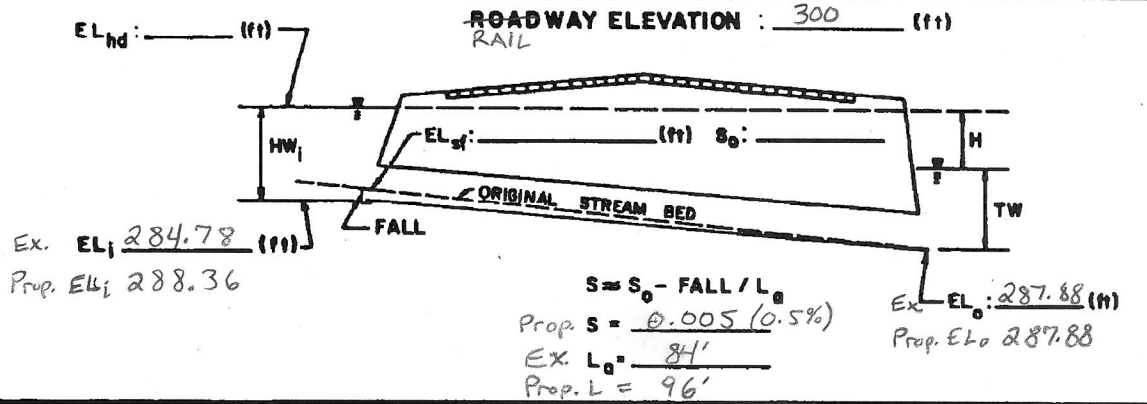
HYDROLOGICAL DATA

SEE ADD'L SHTS.

- ☐ METHOD: NRCS
- ☐ DRAINAGE AREA: 7.25 mi² ☐ STREAM SLOPE: _____
- ☐ CHANNEL SHAPE: _____
- ☐ ROUTING: _____ ☐ OTHER: _____

DESIGN FLOWS/TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)
50	876	submerged
10	557	For this exercise say 2'



CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE (W×H = B×D)	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS: INLET CONTROL HW_i/D (2)	HW_i	FALL (3)	EL_hi (4)	OUTLET CONTROL TW (5)	d_c	(d_c+D)/2	h_o (6)	k_e	H (7)	EL_ho (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
Existing 6.5'×5.5' structure opening w/ HW	557	86	1.29	7.1	0	291.9	2'	5.5	5.5	5.5	0.5	n=0.017 7.21	300.6	300.6	15.6	existing conditions
Proposed 6.5'×6' concrete box w/ HW no embed.	557	86	0.97	5.8	0	294.2	2'	6.0	6.0	6.0	0.5	n=0.013 5.57	299.5	299.5	14.3	prop. no embedment
Proposed 6.5'×6' concrete box w/ HW w/ embed.	557	86	0.97	5.8	0	294.2	2'	6.0	6.0	6.0	0.5	n=0.017 6.16	300.0	300.0	14.3	prop. w/ embedment
Proposed 6.5'×5.5' concrete box w/ HW no embed.	557	86	1.30	7.2	0	295.6	2'	5.5	5.5	5.5	0.5	n=0.013 6.70	300.1	300.1	15.6	prop. no embedment

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) HW_i/D = HW/D OR HW_i/D FROM DESIGN CHARTS

(3) FALL = $HW_i - (EL_{hd} - EL_{sf})$; FALL IS ZERO FOR CULVERTS ON GRADE

(4) $EL_{hi} = HW_i + EL_i$ (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.

(6) h_o = TW or $(d_c + D)/2$ (WHICHEVER IS GREATER)

(7) $H = \left[1 + k_e + (K_u n^2 L)/R^{1.33}\right] v^2/2g$ WHERE Ku = 19.63 (29 IN ENGLISH UNITS)

(8) $EL_{ho} = EL_o + H + h_o$

SUBSCRIPT DEFINITIONS:

a. APPROXIMATE
f. CULVERT FACE
hd. DESIGN HEADWATER
hi. HEADWATER IN INLET CONTROL
ho. HEADWATER IN OUTLET CONTROL
i. INLET CONTROL SECTION
o. OUTLET
sf. STREAMBED AT CULVERT FACE
tw. TAILWATER

COMMENTS / DISCUSSION:

Proposed concrete box culverts w/ and w/o embedment that are acceptable and will mimic existing conditions to the maximum extents practicable are:

6.5'×6' concrete box w/ embedment or 6.5'×5.5' concrete box w/o embedment

CULVERT BARREL SELECTED:

SIZE: _____

SHAPE: _____

MATERIAL: _____ n _____

ENTRANCE: _____

Walpole-Charlestown
NH Route 12
Highway/Railway Corridor Widening and Realignment Project
14747

Stream Crossing Alternative Design Technical Report

Station 3121+40

DRAFT February 2015

Introduction

The project as proposed will affect the crossing of a Tier 3 stream along Route 12 in Charlestown. The NHDES Stream Crossing Regulations, Wt-Env 900 define this crossing as a Tier 3 crossing due to the fact that it is within a designated river corridor; the designated river being the Connecticut River.

Accordingly, this section serves to meet the requirements set forth by Env-Wt 904.01 General Design Considerations, Env-Wt 904.04 Tier 3 Stream Crossings, and Env-Wt 904.05 Design Criteria for Tier 3 Stream Crossings. Refer to Appendix A for additional design support information.

Env-Wt 904.01 General Design Considerations. All stream crossings shall be designed and constructed so as to:
904.01(a) Not be a barrier to sediment transport.

The existing crossing is a 66-inch diameter reinforced concrete pipe. The proposed crossing will be aligned with the natural river bed and is sized so no change in velocity or sediment transport competence is anticipated.

904.01 (b) Prevent the restriction of high flows and maintain existing flows.

The proposed modification will not alter the existing channel cross-section or adjacent floodplain.

904.01(c) Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the water body beyond the actual duration of construction.

Aquatic life movements will not be permanently impacted by the proposed modification. The current conditions include a 66-inch diameter reinforced concrete pipe, which is significantly smaller than the bankfull stream width of 10.3 feet. The proposed crossing will include a natural river bottom and span a width of 14 feet, which is greater than 1.2 times bankfull width. Aquatic organism passage will be greatly improved from the existing structure.

904.01(d) Not cause an increase in the frequency of flooding or overtopping of banks.

The proposed crossing will not increase the frequency of flooding or overtopping of banks.

904.01 (e) Preserve watercourse connectivity where it currently exists.

The proposed crossing will improve watercourse connectivity from existing conditions.

904.01(f) Restore water connectivity where: 1) connectivity was previously disrupted as a result of human activity; and 2) restoration of connectivity will benefit life upstream or downstream of the crossing, or both.

The proposed culvert crossing is greater than 1.2 times the bankfull width and will contain a natural river bottom to improve and restore watercourse connectivity to benefit aquatic life in the area.

904.01 (g) Not cause erosion, aggradation, or scouring upstream or downstream of the crossing, or both.

The proposed culvert will not cause erosion, aggradation, or scouring upstream or downstream of the crossing.

904.01 (h) Not cause water quality degradation.

During construction, appropriate erosion and sedimentation controls will be used to protect the stream.

Env-Wt 904.04 Tier 3 Stream Crossings.
904.04 (a) Designation of tier 3 stream crossing

This crossing is defined as a Tier 3 stream crossing under 904.04(a)(2) because it is located within a designated river corridor, the Connecticut River.

904.04 (b) The applicant for a project in which a stream crossing is categorized as tier 3 based solely on (a)(3) or (4) may request that the crossing be categorized as a tier one or tier 2 stream crossing, as applicable based on watershed size, if there are no impacts to the resource or the impacts to the resource are specifically mitigated in accordance with Env-Wt 800.

The stream crossing is not categorized as a tier 3 stream crossing solely on Env-Wt 904.04(a)(3) or (4).

904.04 (c) If an applicant for a project in which a stream crossing is categorized as tier 3 based solely on (a)(5) wishes to have the crossing categorized as tier one or tier 2 based on watershed size, the applicant shall consult with the NHB if any protected plant species or habitat is impacted or the NHF&G if any protected wildlife species or habitat is impacted. The department shall downgrade the stream crossing to tier one or tier 2, with mitigation if necessary, if the NHB or NHF&G, as applicable, recommend such a downgrade.

The stream crossing is not categorized as a tier 3 stream crossing solely on Env-Wt 904.04(a)(5).

904.04 (d) A tier 3 stream crossing shall be a span structure or an open-bottomed culvert with stream simulation, not a closed-bottom culvert or pipe arch.

The existing stream crossing is a circular concrete pipe with no embedment or stream simulation. The proposed structure will be a box culvert, with at least 2.7 feet embedment with stream simulation. Although not a span or open-bottomed culvert, the proposed embedment depth and alignment meets the New Hampshire Stream Crossing Guidelines to simulate natural stream conditions.

904.04 (e) The applicant shall use an alternative design only if the request is submitted and approved as specified in Env-Wt 904.09(c).

An alternative design is requested to use an embedded box culvert in lieu of a span or open-bottomed culvert design. It is not feasible to build a span or open-bottom structure at this location due to the railroad, which must be actively maintained during construction. The proposed alternative meets the remaining design criteria specified in Env-Wt 904.05 (as discussed further below) and 904.01 (as previously discussed). Refer to Appendix A for design details.

904.04 (f) Compensatory mitigation shall not be required for:
(1) Any new tier 3 stream crossing that is self-mitigating; or(2) Any replacement of a crossing that met all applicable requirements when originally installed but is in a location that results in the crossing being classified as tier 3 under these rules, provided the proposed stream crossing meets the requirements of Env-Wt 904.08.

The proposed stream crossing is self-mitigating as it greatly improves water connectivity and benefits wildlife, therefore compensatory mitigation for this crossing is not required.

904.04 (g) Plans for a tier 3 stream crossing shall be stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Plans will be stamped by a professional engineer licensed under RSA 310-A to practice in New Hampshire.

904.04 (h) Construction involving in-stream work shall be limited to low flow conditions.

Construction of the replacement stream crossing will be performed during low flow conditions.

904.04 (i) Crossings that require excavation in flowing water shall use best management practices, such as temporary by-pass pipes, culverts, or cofferdams, so as to maintain normal flows and prevent water quality degradation.

During the construction phase of the project several measures will be taken to maintain normal flows and prevent water quality degradation. Cofferdams, properly sized by-pass piping, scour protection, erosion controls, and dewatering equipment with sedimentation measures will be in use.

Env-Wt 904.05 Design Criteria for Tier 2 and Tier 3 Stream Crossings. New and replacement tier 3 stream crossings shall be designed and constructed:

904.05(a) In accordance with the NH Stream Crossing Guidelines, University of New Hampshire, May 2009.

The proposed stream crossing design conforms to the NH Stream Crossing Guidelines.

904.05(b) With the bed forms and streambed characteristics necessary to cause water depths and velocities within the crossing structure at a variety of flows to be comparable to those found in the natural channel upstream and downstream of the stream crossing.

Water depths and velocities within, upgradient and downgradient of the crossing structure were evaluated to confirm the proposed design conforms to this criteria.

904.05(c) To provide a vegetated bank on both sides of the watercourse to allow for wildlife passage.

Vegetated slopes will be provided along portions of the impacted banks that will also continue both upstream and downstream of the culvert to promote wildlife passage and provide habitat.

904.05(d) To preserve the natural alignment and gradient of the stream channel, so as to accommodate natural flow regimes and the functioning of the natural floodplain.

The proposed culvert is designed to preserve the natural alignment and gradient of the stream channel and accommodates natural flows regimes.

904.05(e) To accommodate the 100-year frequency flood, to ensure that:

1) There is no increase in flood stages on abutting properties; and

The proposed modification will not change the 100-year floodplain or affect flooding on abutting properties. The proposed culvert is wider than the existing culvert to better accommodate natural stream flows.

2) Flow and sediment transport characteristics will not be affected in a manner which could adversely affect channel stability.

An evaluation of the culvert design was completed that supports the proposed culvert will not adversely affect channel stability.

904.05(j) To simulate a natural stream channel.

The proposed culvert has been designed to simulate a natural stream channel, with a width greater than 1.2 times the bankfull width and a bottom substrate and gradation that conforms to the guidelines for channel bed mobility and culvert bed stability.

904.05(g) So as not to alter sediment transport competence.

The proposed culvert is designed with a natural river bottom and gradient and the width exceeds 1.2 times the natural bankfull width so as to not alter sediment transport competence.

Appendix A
Stream Crossing Design Details

MEMORANDUM

To:	Ted Setas, Jacobs
From:	Scott Salvucci, Project Engineer, CEI
Subject:	Preliminary Hydrologic & Hydraulic Evaluation
Job No.	NHDOT – 14747 CEI – 654-1
Date:	December 13, 2013

The following memo outlines the preliminary hydrologic and hydraulic evaluation of the existing culvert stream crossing on Route 12, at Station 3121+40, in Charlestown. The existing culvert is a 55-inch diameter reinforced concrete pipe. This culvert is proposed to be replaced and is required to meet the NH Stream Crossing Guidelines as part of the Walpole-Charlestown NH Route 12 Highway/ Railway Corridor Widening and Realignment Project.

Structure Width

Field investigation and stream measurements performed by CEI yielded the following data:

- Bankfull Stream Width = 10.3 feet
- Bankfull Stream Mean Depth = 1.2 feet
- Width/Depth Ratio = 8.6
- Floodprone Width = 37.0 feet
- Entrenchment Ratio = 3.6 – Minor Entrenchment
- Sinuosity = 1.1 – Low

Please note that this data was calculated based on the average values found at the stream cross-sections not immediately upstream or downstream of the existing culvert to avoid altered stream characteristics closer to the culvert openings.

	Bankfull Width (feet)
Existing Stream Average	10.3
1.2 x Bankfull Width	12.3
1.2 x Bankfull Width + 2 Feet	14.3

Please utilize a crossing span of at least 14-feet when evaluating design options.

Structure Slope

As required by the New Hampshire Code of Administrative Rules Ent-Wt 904.04 (d), a Tier 3 stream crossing shall be a span structure or an open-bottomed culvert with stream simulation substrate, not a closed-bottom culvert or pipe arch. Stream simulation design will allow the stream channel within the structure to mimic the geomorphic processes of the natural stream channel. If a bottomless structure is not feasible, an alternative design may be proposed to incorporate an embedded box culvert.

A closed bottom box culvert must be embedded at least 2 feet. This embedment depth will be determined based on the stream bed elevations upstream and downstream of the crossing. The structure can be designed with no slope, allowing the stream bed within the culvert to create a slope based on the natural sediment bed load moving along the stream. The structure can also be design with a slope, allowing for a uniform depth of embedment material across the bottom of the sloped structure.

In this particular case, the inlet invert of the existing culvert has been measured at elevation 288.42 feet. The outlet invert has been measured at elevation 286.88 feet. These inverts appear to be below the adjacent stream bed elevations both upstream and downstream. After performing a long profile analysis of the existing stream bed the optimal elevation to set the stream invert within the proposed structure will be approximately 288.70 feet. This will account for the surrounding streambed elevation up and downstream of the existing structure. It is important to set the structure with enough embedment to account for long-term vertical channel adjustment. An embedded structure at this crossing may require an embedment depth greater than 2 feet to accommodate material transport therefore we recommend 3.5 feet of substrate for a closed box culvert.

Structure Rise

The following water surface profiles were determined utilizing HEC-RAS modeling.

Existing 55-inch Reinforced Concrete Pipe			
Storm Event	Peak Discharge (cfs)	Peak Water Surface Elevation (feet)	
		Upstream Existing Culvert	Downstream Existing Culvert
2-Year (Approx. Bankfull)	11.94	290.84	290.81
10-Year	62.90	292.09	291.84
25-Year	124.4	293.32	292.41
50-Year	195.1	294.93	292.89
100-Year	290.6	297.46	293.42

Proposed 14-foot Wide by 5-foot high Concrete Box Culvert			
Storm Event	Peak Discharge (cfs)	Peak Water Surface Elevation (feet)	
		Upstream Proposed Culvert	Downstream Proposed Culvert
2-Year (Approx. Bankfull)	11.94	290.83	290.81
10-Year	62.90	291.93	291.84
25-Year	124.4	292.58	292.41
50-Year	195.1	293.23	292.89
100-Year	290.6	294.02	293.42

The peak water surface elevations produced by this stream crossing will continue to have no roadway/railway flooding implications based on a 14-foot wide by 5-foot high box culvert flow opening. Please note this box culvert would need to be at least 14-feet by 8.5-feet to incorporate at least 3.5-feet embedment.

The stream crossing in question does not pose a flooding threat to Route 12.

If you have any questions or comments, please feel free to contact me.

MEMORANDUM

To:	Clinton Mercer & Aaron Seaman, Jacobs
From:	Matt Lundsted & Scott Salvucci, CEI
Subject:	Walpole-Charlestown Stream Crossing #9 Update
Job No.	NHDOT – 14747 CEI – 654-1
Date:	June 12, 2014 Revised: August 28, 2014

The following is an update to the December 13, 2013 memo regarding the preliminary hydrologic and hydraulic evaluation at "Crossing 9" (Station 3121+34) along the Walpole-Charlestown NH Route 12 highway/railway corridor widening and realignment project. This update includes sizing recommendations to meet 1-foot of freeboard within the bridge structure, as well as stream bed gradation for the structure embedment.

This analysis is based upon uninterrupted flows from the contributing watershed. A 48-inch RCP beneath Route 12-A is currently positioned upstream of Crossing 9. The sizing recommendations for Crossing 9 described below will be adequate if the existing 48-inch RCP is redesigned to meet the NH stream crossing standards in the future.

Structure Slope

The inlet invert of the existing culvert at crossing 9 has been measured at elevation 288.42 feet. The outlet invert has been measured at elevation 286.88 feet. These inverts appear to be below the adjacent stream bed elevations both upstream and downstream. After performing a long profile analysis of the existing stream bed the optimal elevation to set the stream invert within the proposed structure will be approximately 288.70 feet, please see the figure attached at the end of this memo. This elevation will be the constructed streambed elevation within the structure and in the immediate vicinity disturbed during construction. This will account for the surrounding streambed elevation up and downstream of the structure. It is important to set the structure with enough embedment to account for long-term vertical channel adjustment. An embedded structure at this crossing may require an embedment depth greater than 2 feet to accommodate material transport therefore we recommend 2.7 feet of substrate for a closed box culvert. This embedment depth will allow for possible degradation of the streambed when the stream is no longer constricted. The structure size will be rounded up to the nearest 1-foot increment to account for possible degradation as well as a more standard concrete culvert size to be fabricated and installed.

The need for bed retention sills within the culvert to assist with streambed stability was examined. Typically sills are used within culverts designed to have a 6% slope or greater. The proposed culvert at crossing 9 will be installed with a 0.5% slope. Bed retention sills are not recommended for this culvert replacement. Sills tend to act as barriers for aquatic organisms within the substrate, within this low gradient stream segment sills may become more of a

nuisance than solution. Rock banks are a secondary option that would ease the aquatic organism barrier concern while providing bed-control. Rock bands will not be required for this culvert replacement based on the streambed gradation designed for the embedment of the culvert, described below. The streambed has been designed to ensure stability through the 100-year storm event.

Structure Rise

The following water surface profiles were determined utilizing HEC-RAS modeling. The model analyzed the effects of the stream crossing without tailwater effects from the Connecticut River in order to ensure proper sizing for the stream crossing alone. The Connecticut River will completely inundate crossing 9 during severe storm events, please see the figure attached at the end of this memo.

The peak water surface elevations produced by this **stream** will continue to have no roadway/railway flooding implications based on a 14-foot wide by 6.3-foot high box culvert flow opening. The top of the structure opening is proposed to be at elevation 295.00. This elevation with the corresponding modeling results will produce 1-foot of freeboard within the structure during the 100-year storm produced by this **stream**. Please note this box culvert would need to be at least 14-feet by 9-feet to incorporate at least 2.7-feet embedment.

Existing 66-inch Reinforced Concrete Pipe			
Storm Event	Peak Discharge (cfs)	Peak Water Surface Elevation (feet)	
		Upstream Existing Culvert	Downstream Existing Culvert
2-Year (Approx. Bankfull)	11.94	290.84	290.81
10-Year	62.90	292.09	291.84
25-Year	124.4	293.32	292.41
50-Year	195.1	294.93	292.89
100-Year	290.6	297.46	293.42

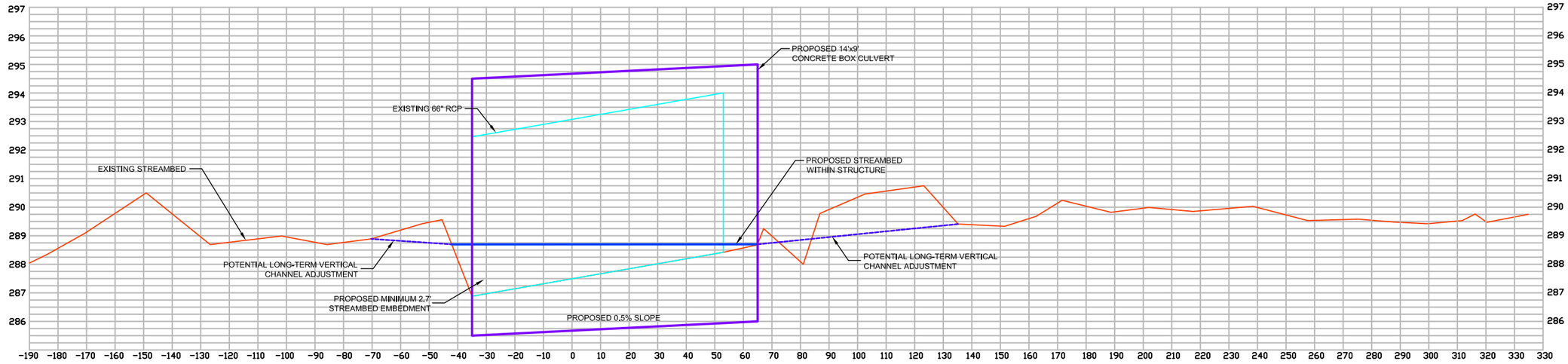
Proposed 14-foot Wide by 6.3-foot high Concrete Box Culvert			
Storm Event	Peak Discharge (cfs)	Peak Water Surface Elevation (feet)	
		Upstream Proposed Culvert	Downstream Proposed Culvert
2-Year (Approx. Bankfull)	11.94	290.83	290.81
10-Year	62.90	291.92	291.84
25-Year	124.4	292.58	292.41
50-Year	195.1	293.22	292.89
100-Year	290.6	294.00	293.42

The downstream water surface elevations show no change throughout the modeling process. The existing constriction produced by the 66-inch RCP will be alleviated upstream of the crossing. The headwater impounded upstream of the crossing during severe storm events will be lessened, providing a greater freeboard between the railway and the stream peak water surface elevations.

Structure Embedment

The streambed gradation for the proposed structure embedment has been designed in accordance with the FHWA HEC#26, Culvert Design for Aquatic Organism Passage (Oct 2010) design procedures outlines in Chapter 7, and associated appendices. The 100-year storm peak flow was utilized in sizing the streambed gradation to ensure stability. Sediment transport has been considered and portions of the finer streambed material will be mobile, and replaced by recruitment during larger storm events. It is important to use stones that are rounded boulders and cobbles within the streambed, not angular riprap. Please find the design calculations attached at the end of this memo.

Particle Size (inches)	% By Weight Passing
16.0	100
13.3	90-95
10.4	79-84
3.7	45-50
0.38	11-16
No. 4 Sieve	8-10
No. 18 Sieve	5



COMPREHENSIVE ENVIRONMENTAL INCORPORATED
225 CEDAR HILL STREET
MARLBOROUGH, MA 01752

CROSSING #9
STATION 3121+34

LONG PROFILE

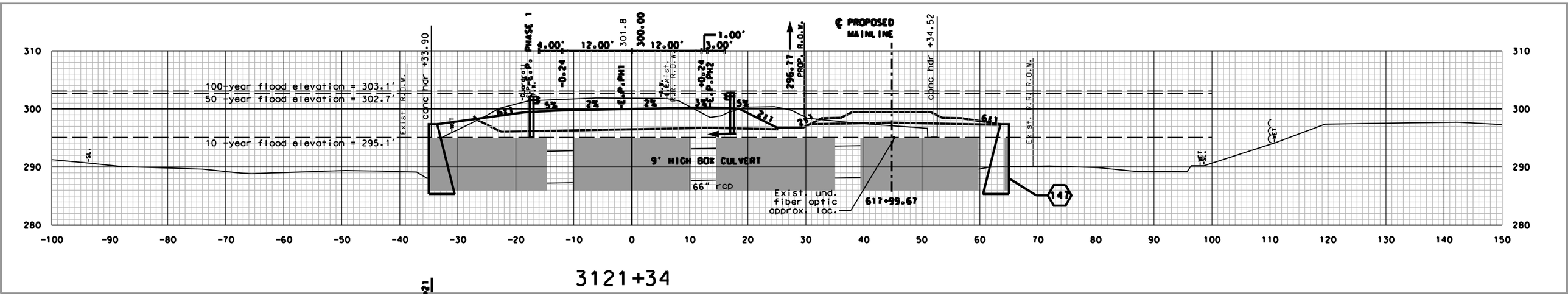
WALPOLE-CHARLESTOWN

VERTICAL SCALE 1" = 4'

4 0 4 8

40 0 40 80

HORIZONTAL SCALE 1" = 40'


100-year flood elevation = 303.1'
50 -year flood elevation = 302.7'
10 -year flood elevation = 295.1'
Exist. R.O.W.
conc hdr +33.90
4.00'
12.00'
301.8
300.00
12.00'
1.00'
3.00'
-0.24
E.P.PH1
E.P.PH2
Exist. R.O.W.
296.11
PROP. R.O.W.
℄ PROPOSED MAINLINE
conc hdr +34.52
Exist. R.R.
R.O.W.
9' HIGH BOX CULVERT
66" rcp
Exist. und. fiber optic approx. loc.
617+99.67
147
3121+34
310
300
290
280
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

Project: Walpole-Charlestown NH Route 12 Highway/
Railway Corridor Widening and Realignment Project
NHDOT Project No.: 14747
Location: Charlestown, NH
Stream Name: Crossing 9
Stream Location: 3121+34

Aquatic Organism Passage

Reference - FHWA HEC#26, Culvert Design for Aquatic Organism Passage (Oct 2010)
Chapter 7 - Design Procedure, Associated Appendices

Step 1. Determine Design Flows

Peak Flow	Q_P	= Flood Peak Flow, Design Flow
High Passage Flow	Q_H	= 25% of $Q_{2\text{-YR}}$
Low Passage Flow	Q_L	> 1 cfs

Flood Peak Flow	Q_P =	290.6	cfs
	Q_H =	3.0	cfs
	Q_L =	2.0	cfs
Bankfull Discharge	Q_2 =	11.9	cfs
FEMA Flood Study	Q_{10} =	62.9	cfs
	Q_{50} =	195.1	cfs
	Q_{100} =	290.6	cfs

Step 2. Determine Project Reach and Representative Channel Characteristics

- Project reach should extend, at a minimum, both upstream and downstream from the culvert location no less than three (3) culvert lengths or 200 feet, whichever is greater.
- Representative Channel Characteristics should be established from a minimum of six (6) cross-sections. Three (3) upstream and three (3) downstream of the culvert location.
- Bed material samples should be taken to produce a particle size distribution curve including estimates of the D_{16}, D_{50}, D_{84}, and D_{95} of the bed.

Step 3. Check for Dynamic Equilibrium

- A state of 'dynamic' equilibrium can be estimated when reach averaged characteristics and the balance between sediment inflow and sediment outflow are maintained.
- Common indicators of channel instability include: Head cutting, and Bank instability/erosion
- Perform Step 4 if stream is unstable; if in dynamic equilibrium continue to Step 5.

Step 4. Analyze and Mitigate Channel Instability

- Consult HEC#20 and HEC#23

Step 5. Align and Size Culvert for Q_P

- Size based on HEC#5

Culvert Size

Length =	100.0	feet
Width =	14.0	feet
Height =	9.0	feet

- Vertical and Horizontal Alignment - Aligned with the existing stream bed
- Length - Minimized to the extent feasible
- Embedment - Maximum of these three values - Section 7.5.3

20% for Box and Pipe Arch =	1.8	feet
One times the D_{95} for Box and Pipe Arch =	1.1	feet
At least 2 feet or greater =	2.7	feet
Embedment =	2.7	feet

- Bed Gradation - Appendix F

D_{50} =	3.68	inches
m =	0.5	parameter that determines how fine or course the resulting mix will be. Use m values between 0.45 and 0.70
D_{95} =	13.28	inches
D_{84} =	10.39	inches
D_{16} =	0.38	inches
D_5 =	0.0368	No larger than 0.079 inches

Note - Unstable bed material at Q_P may require Oversized Bed Material Gradation (See below)

- Manning's n - Appendix C

n_{bed} =	0.065	From FEMA Flood Study
P_{bed} =	14.0	wetted perimeter of natural material in the culvert, ft
n_{wall} =	0.013	manning's of culvert wall material
P_{wall} =	12.6	wetted perimeter of culvert walls above the natural material, ft
$n_{composite}$ =	0.045	

- Debris - Will this be a concern?
- Culvert Analysis and Design Tools - Computer Programs: HY-8 and HEC-RAS

Step 6. Check Culvert Bed Stability at Q_H

Methods in Appendix D

Slope	Method for Evaluating Stability
0 - 3%	Modified Shield's Method
Up to 5%	Modified Shield's Method
3 - 5%	Modified Shield's Method & Critical Unit Discharge Method (Use Most Conservative)
3 - 10%	Critical Unit Discharge Method
5 - 10%	Critical Unit Discharge Method
10 - 20%	Critical Unit Discharge Method

- Permissible Shear Stress

Comparison of the Applied Shear Stress to the Permissible Shear Stress (the ability of a bed material to resist movement)

Noncohesive Materials - wide range of material sizes greater than 2 inches (Section 7.6.1.1)

Cohesive Materials - largely fine grained materials (Section 7.6.1.2)

Q_H

$\tau_p = F\,(\gamma_s - \gamma)\,D_{84}^{0.3} * D_{50}^{0.7}$ - Used for slopes 5% or less

τ_p =	1.9204	permissible shear stress, lb/ft^2
F =	0.047	Shield's parameter for D_{50} (Table 7.1), based on Reynolds # R_e
γ_s =	160	specific weight of stone, lb/ft^3 (typical 156 to 165 lb/ft^3)
γ =	62.4	specific weight of water, lb/ft^3

$R_e = (\sqrt{(gyS)} * D_{50}) / \nu$

R_e =	8,746	particle Reynolds number
D_{50} =	0.31	feet
g =	32.2	gravitational acceleration, ft/s^2
y =	1.00	maximum channel depth during Q_H, ft
S =	0.005	channel slope, ft/ft
ν =	1.407E-05	kinematic viscosity, ft^2/s

Applied Shear Stress

$\tau_D = \gamma\ y\ S$

τ_D =	0.0125	maximum applied shear stress, lb/ft^2
γ =	62.4	specific weight of water, lb/ft^3
y =	1.00	maximum channel depth during Q_H, ft
S =	0.000	energy slope, ft/ft

S = H/L

S =	0.0002	energy slope, ft/ft
H =	0.020	flow grade line, ft (HW-TW)
L =	100.0	culvert length, ft

τ_p	>	τ_D	**CHECK**

Q_P

$\tau_p = F\ (\gamma_s - \gamma)\ D_{84}^{0.3} * D_{50}^{0.7}$ - Used for slopes 5% or less

τ_p =	1.9204	permissible shear stress, lb/ft^2
F =	0.047	Shield's parameter for D_{50} (Table 7.1), based on Reynolds # R_e
γ_s =	160	specific weight of stone, lb/ft^3 (typical 156 to 165 lb/ft^3)
γ =	62.4	specific weight of water, lb/ft^3

$R_e = (\sqrt{(gyS)} * D_{50}) / \nu$

R_e =	20,134	particle Reynolds number
D_{50} =	0.31	feet
g =	32.2	gravitational acceleration, ft/s^2
y =	5.30	maximum channel depth during design flow, ft (HW in HEC-RAS model)
S =	0.005	channel slope, ft/ft
ν =	1.407E-05	kinematic viscosity, ft^2/s

Applied Shear Stress

$\tau_D = \gamma\ y\ S$

τ_D =	1.9182	maximum applied shear stress, lb/ft^2
γ =	62.4	specific weight of water, lb/ft^3
y =	5.3	maximum channel depth during design flow, ft (HW in HEC-RAS model)
S =	0.006	energy slope, ft/ft

S = H/L

S =	0.006	energy slope, ft/ft
H =	0.58	flow grade line, ft (HW-TW from HEC-RAS model)
L =	100.0	culvert length, ft

τ_p	>	τ_D	**CHECK**

Step 7. Check Channel Bed Mobility at Q_H

Compare the relative mobility of the streambed material in the culvert to the relative mobility of the streambed material in the upstream and downstream channel.

- If the maximum applied shear stress for any CHANNEL cross-section is less than the permissible shear stress - redesign of the culvert to achieve a stable bed.
- If the maximum applied shear stress for all CHANNEL cross-sections are greater than the permissible shear stress - the bed may be considered mobile.

Step 8. Check Culvert Bed Stability at Q_P

If the applied shear stress within the culvert is less than or equal to the permissible shear stress for the bed material, the culvert bed is stable.

Steps 9 through 13 for more indepth designs

Appendix F Wetland Color Photos

Photograph 1: July 11, 2016 – Area A (Bank) at Station 2012+25, looking south from Highway 12.

Photograph 2: July 11, 2016 – Area B (R2UB3), C (Bank) and D (R2UB3) at Station 2014+00, looking northwest from Highway 12.

Photograph 3: November 7, 2011 – Area E (R4SB3) at Station 2015+30, looking west.

Photograph 4: November 7, 2011 – Area E (R4SB3) at Station 2015+30, looking west from further upstream.

Photograph 5: July 11, 2016 – Area C (Bank) at Station 2018+00, looking south from Highway 12.

Photograph 6: July 11, 2016 – Area C (Bank) at Station 2022+25, looking north from Highway 12.

Photograph 7: July 11, 2016 – Area F (Bank) and G (R2UB3) at Station 2024+50, looking northwest from Highway 12.

Photograph 8: November 7, 2011 – Area I (R4SB3) at Station 2026+25, looking west.

Photograph 9: November 7, 2011 – Area I (R4SB3) at Station 2026+25, upstream.

Photograph 10: July 11, 2016 – Area F (Bank), G (R2UB3), and H (R2UB3) at Station 2028+50, looking southwest from Highway 12.

Photograph 11: July 11, 2016 – Area F (Bank) at Station 2030+00, looking north from Highway 12.

Photograph 12: November 7, 2011 – Area J (R4SB3) at Station 2031+00, looking west.

Photograph 13: November 7, 2011 – Area J (R4SB3) at Station 2031+00, looking east upstream.

Photograph 14: July 11, 2016 – Area F (Bank) at Station 2037+75, looking south from Highway 12.

Photograph 15: November 7, 2011 – Area K (R4SB3) at Station 2039+75, looking east upstream.

Photograph 16: November 7, 2011 – Area K (R4SB3) at Station 2039+75, looking east upstream.

Photograph 17: July 11, 2016 – Area F (Bank) and G (R2UB3) at Station 2040+00, looking northwest from Highway 12.

Photograph 18: July 11, 2016 – Area F (Bank) and L (Bank) at Station 2042+00, looking northwest from Highway 12.

Photograph 19: September 25, 2013 – Area O (R4SB3) at Station 2045+60, looking south.

Photograph 20: September 25, 2013 – Area O (R4SB3) at Station 2045+60, looking west.

Photograph 21: July 11, 2016 – Area M (Bank) and N (Bank) at Station 2046+25, looking southwest from Highway 12.

Photograph 22: September 25, 2013 – Area Q (R4SB3) at Station 2052+60, looking east.

Photograph 23: September 25, 2013 – Area P (PFO/PSS1E), Q (R4SB3), and R (PFO/PSS1E) at Station 2052+60.

Photograph 24: September 25, 2013 – Area P (PFO/PSS1E), Q (R4SB3), and R (PFO/PSS1E) at Station 2052+60, looking west.

Photograph 25: September 25, 2013 – Area S (R4SB3) at Station 2067+00, looking west.

Photograph 26: September 25, 2013 – Area T (R4SB3) and U (R4SB3) at Station 2067+00, looking north.

Photograph 27: September 25, 2013 – Area T (R4SB3) and U (R4SB3) at Station 2067+00, looking west.

Photograph 28: July 11, 2016 – Area V (PF01E) and W (PF01E) at Station 2069+50, looking north from Highway 12.

Photograph 29: July 11, 2016 – Area V (PF01E) and X (PF01E) at Station 2071+75, looking north from Highway 12.

Photograph 30: July 11, 2016 – Area X (PF01E), Y (PF01E), and Z (POW) at Station 2074+75, looking south from Highway 12.

Photograph 31: July 11, 2016 – Area Z (POW) at Station 2074+75, looking west from Highway 12.

Photograph 32: July 11, 2016 – Area X (PF01E), Y (PF01E), Z (POW), AA (POW), and AB (POW) at Station 2074+75, looking north from Highway 12.

Photograph 33: July 11, 2016 – Area X (PF01E) and AC (PF01E) at Station 2076+50, looking south from Highway 12.

Photograph 34: July 11, 2016 – Area AA (POW) and AD (POW) at Station 2079+50, looking southwest from Highway 12.

Photograph 35: July 11, 2016 – Area AE (PSS1E) and AF (PSS1E) at Station 2081+25, looking southwest from Highway 12.

Photograph 36: July 11, 2016 – Area AG (PSS1E), AH (PSS1E), AI (POW), and AJ (POW) at Station 2081+50, looking northwest from Highway 12.

Photograph 37: July 11, 2016 – Area AK (POW), and AL (POW) at Station 2085+50, looking northwest from Highway 12.

Photograph 38: July 11, 2016 – Area AM (PSS/PF01E), and AN (PSS/PF01E) at Station 2085+50, looking north from Highway 12.

Photograph 39: July 11, 2016 – Area AM (PSS/PF01E), and AO (PSS/PF01E) at Station 2088+25, looking north from Highway 12.

Photograph 40: July 11, 2016 – Area AM (PSS/PF01E) and AP (PSS/PF01E) at Station 2091+00, looking north from Highway 12.

Photograph 41: July 11, 2016 – Area AQ (PSS/PF01E) at Station 2092+00, looking west from Highway 12.

Photograph 42: July 11, 2016 – Area AR (Bank) and AT (Bank) at Station 2095+00, looking northwest from Highway 12.

Photograph 43: July 11, 2016 – Area AV (Bank) and AW (Bank) at Station 2096+75, looking north from Highway 12.

Photograph 44: July 11, 2016 – Area AX (Bank), AY (Bank), and AZ (R2UB3) at Station 2100+75, looking south from Highway 12.

Photograph 45: July 11, 2016 – Area AY (Bank), AZ (R2UB3), and BA (R2UB3) at Station 2100+75, looking north from Highway 12.

Photograph 46: July 11, 2016 – Area AY (Bank), AZ (R2UB3), and BA (R2UB3) at Station 2105+00, looking south from Highway 12.

Photograph 47: September 25, 2013 – Area BB (POW) at Station 2105+75.

Photograph 48: September 25, 2013 – Area BB (POW) at Station 2105+75.

Photograph 49: July 11, 2016 – Area AZ (R2UB3), BA (R2UB3), and BC (Bank) at Station 2107+50, looking north from Highway 12.

Photograph 50: July 11, 2016 – Area AZ (R2UB3), BA (R2UB3), and BD (Bank) at Station 2112+00, looking northwest from Highway 12.

Photograph 51: October 10, 2016 – Area AZ (R2UB3), BA (R2UB3), and BD (Bank) at Station 2116+50, looking south from Highway 12.

Photograph 52: October 10, 2016 – Area AZ (R2UB3), BA (R2UB3), and BD (Bank) at Station 2116+50, looking northwest from Highway 12.

Photograph 53: October 10, 2016 – Area BE (Bank) and BF (PEM1E) at Station 2118+75, looking south from Highway 12.

Photograph 54: October 10, 2016 – Area BG (PEM1E) at Station 2118+75, looking north from Highway 12.

Photograph 55: October 10, 2016 – Area BH (PF01E) and BI (PF01E) at Station 2121+00, looking south from Highway 12.

Photograph 56: September 25, 2013 – Area BN (R2UB3) at Station 2121+40, upstream end, looking northwest.

Photograph 57: September 25, 2013 – Area BM (PEM1E), BN (R2UB3), and BO (PEM1E) at Station 2121+40, looking north.

Photograph 58: October 10, 2016 – Area BH (PF01E) and BL (PF01E) at Station 2122+75, looking south from Highway 12.

Photograph 59: October 10, 2016 – Area BR (PEM1E) at Station 2146+00, looking north from Highway 12.

Photograph 60: October 10, 2016 – Area BP (PEM1F), BQ (PEM1F), BS (POWH) and BT (PEM1F) at Station 2148+00, looking south from Highway 12.

Appendix G Natural Resource Agency Meeting Minutes

BUREAU OF ENVIRONMENT
CONFERENCE REPORT

SUBJECT: NHDOT Monthly Natural Resource Agency Coordination Meeting
DATE OF CONFERENCE: February 15th, 2017
LOCATION OF CONFERENCE: John O. Morton Building
ATTENDED BY:

NHDOT
Sarah Large
Ron Crickard
Mark Hemmerlein
David Kammer
Marc Laurin
Kevin Nyhan
Rebecca Martin
Jon Evans
Steve Johnson
Cassandra Burns
Stephanie Micucci
Bill Saffian
Sally Gunn
Don Lyford
Shaun Flynn
Samantha Fifield
C.R. Willkie
Joseph Adams
Michael Licciardi
Jon Hebert
Wendy Johnson
Bob Landry

EPA
Mark Kern

NHDES
Gino Infascelli
Lori Sommer
Pierce Rigrod

NHF&G
Carol Henderson
John Magee

NH Natural Heritage Bureau
Amy Lamb

Consultants/Public Participants
Dawn Tuomala
Jim Bouchard
Lisa Martin
Don Lussier
John Parrelli
Josif Bicja
Kimberly Peace
Sean James
Brad Harriman
Christine Perron
Brian Colburn
Matt Lundsted
Clint Mercer
David Kull
Jed Merrow

(When viewing these minutes online, click on an attendee to send an e-mail)

PRESENTATIONS/ PROJECTS REVIEWED THIS MONTH:
(minutes on subsequent pages)

(When viewing these minutes online, click on a project to zoom to the minutes for that project)

reviewed with binoculars for signs of bat usage, and close-up bridge inspection photographs of the bridge were also reviewed. No evidence of roosting has been observed. There are no known maternity roost trees or hibernacula in the vicinity of the project. A Project Submittal Form has been sent to USFWS by NHDOT with a finding of May Effect, Not Likley to Adversely Affect. The project was reviewed with NH Fish & Game and there were no concerns regarding bald eagle or cobblestone tiger beetle. Section 106 consultation has resulted in a determination of No Historic Properties Affected. The US Coast Guard has concurred that the project is exempt from a Bridge Permit under Section 144(h).

M. Hicks asked if there is a local harbor master or similar entity for this area that could be notfied about impacts to recreational boating during construction. The Connecticut River Joint Commissions is aware of the project and will receive a copy of the permit application. M. Hicks also asked about the substrate of the river, which is predominantly sand and gravel at the bridge site. M. Hicks asked about public input received on the project. There has been one Public Officials Meeting with Lebanon City Officials and a Public Informational Meeting. Letters have also been sent to Lebanon and Hartford boards and organizations. No concerns about the project have been raised.

A survey for the state listed mudflat spikesedge was completed in October 2015 and the plant was not found in the project area. Amy Lamb noted that a number of new occurences of this species were located along the river during the recent drought when the water level was lower than normal. She recommended checking the project area again for this plant if the water levels remain low enough.

The permit application is expected to be submitted to DES in late April.

This project has been previously discussed at the 5/21/2014, 11/19/2014, and 2/17/2016 Monthly Natural Resource Agency Coordination Meetings.

Walpole-Charlestown, #14747 (X-A004(487))

Jon Evans began by providing a brief overview of the project's history to date and that the project had been reviewed at several prior meetings with the last being March 16, 2016. J. Evans also noted that the goal of this meeting was to review current estimated wetland impacts and determine USACE permitting needs. Matt Lundsted took over by running through a short presentation summarizing that the current proposed alternative (western alignment shift away from the railroad and Fall Mountain) removes physical impacts to the railroad tracks (property encroachment only), minimizes environmental impacts from blasting, avoids the rock cut and tree clearing to the east of the railroad, eliminates impacts to Fall Mountain State Forest and cuts construction costs and duration.

The presentation went on to outline typicals of what the slope work along the banks of the Connecticut River and Meany's Cove would look like detailing specific cross sections at three stations (one in the southern portion of the project into the Connecticut River, one through the Meany's Cove segment and one in the northern portion of the project into the Connecticut River). Finally permanent and temporary wetland and bank impacts in each community were summarized.

Lori Sommer inquired what the intent of the "potential construction platform" was for. Clint Mercer explained that the slope work to the southern end of the project is too high to construct from the top of slope so temporary work platforms would likely be needed. This would ultimately be determined by the Contractor since he is responsible for means and methods however the impacts shown are intended to illustrate the maximum probable extent.

M. Lundsted went on to note that the project team had met previously with Gino Infascelli and L. Sommer sometime last year to discuss stream crossings such as Crossing #9 (unnamed brook) and that impacts to the east of Route 12 to these streams have been eliminated. In summary, permanent wetland impacts are under 3 acres at 2.94 acres and the resulting ARM calculation is $2.58M. It was noted that the impacts shown are the maximum amount and they may be reduced pending further geotechnical work.

Mike Hicks noted that USACE considers all impacts (permanent + temporary) regarding general versus individual federal permits. The wetland threshold is under 3 acres and impacts within the Connecticut River are under 1 acre within the water to be eligible for the general permit. Mark Kern noted at the impact levels currently shown an Individual Permit would be required and based on the current way that the PGP is written it wouldn't be worth the effort to try to "slip" under those thresholds and raise concerns with the various regulatory agencies.

L. Sommer inquired as to the duration of the impacts within the river. C. Mercer estimated a 20 month total construction duration with a total of approximately 8 months within the river.

M. Kern inquired about the break down in how the ARM fee was calculated. J. Evans noted that the biggest component is linear footage of bank impact with some portion of the square footage of wetland impact (portions not overlapping bank impacts which take precedence but do not get "double counted") comprising the balance. L. Sommer asked that the latest revision to the ARM calculator was used and inquired whether the communities been queried regarding potential ARM projects. J. Evans confirmed it was the latest form and replied that the communities had been contacted in prior years once wetland impacts were calculated for the previous version of the project and neither community identified any local opportunities. Culvert improvements may be a feasible use of funds. L. Sommer also noted that either the Upper Valley Land Trust or the Ausbon Sargent Land Preservation Trust may have potential mitigation opportunities which she will email about.

M. Kern asked about how the bank will look/vegetation. S. Fifield went into more detail on the proposed slope/bank noting that the intention is for it to be a "green" slope as much as possible. Below the water line will be stone however the upper bank will be planted with native species. The Department is currently performing an audit of existing trees to propose like species. M. Kern inquired as to the proposed depth of stone. S. Fifield noted that the detail shows three feet however the geotechnical engineers are still looking at options for the design of the slope.

J. Evans requested clarification on how the ARM fund transfer actually works. L. Sommer responded that DES prefers that you provide funds directly to a land trust and J. Evans noted that may be difficult for the Department administratively. L. Sommer said that DES can write a condition within permit that funds get designated to the land trust with payment through/to DES and DES sends funds to the land trust. Don Lyford asked that if the land trust's plan for the funds falls through whether the funds still go to DES and into standing ARM funds which was confirmed.
M. Kern noted that with an individual USACE permit, a water quality certificate (WQC) would be required. Mark Hemmerlein noted that the WQC will be a challenging effort for this particular project since opportunities for water quality improvements have been studied extensively throughout the duration of design and few opportunities exist for stormwater BMPs particularly with the river being stressed for nitrogen (N). Geotechnical concerns with soil, ledge and groundwater conditions limit opportunities along the river side and the proximity of the railroad limit opportunities to the east of Route 12. It would be close to impossible to obtain the amount of N treatment needed.

Discussion took place regarding options for permitting the project individually by town to potentially get under thresholds but it was noted that the impacts in Walpole alone exceed "general permit" levels. D.

Lyford inquired if Meany's Cove was considered part of the river and whether a distinction would impact thresholds. It was noted that impacts outside the river exceed thresholds anyway.
Although M. Kern expressed support for obtaining an individual Army Corps permit he noted that if in the future it was determined through project modification or coordination with the resource agencies that the project would in fact qualify for coverage under the NH Programmatic General Permit, the EPA would not object and thus would not request an individual permit be obtained for this effort.

L. Sommer inquired as to what the current drainage is doing in this location and whether any culverts would be retrofitted. S. Fifield noted that much of the runoff is sheet runoff or is collected at around five locations in pipes (which will be extended through the proposed slope). D. Lyford noted that an underdrain is proposed along the railroad side. M. Hemmerlein noted that another concern regarding water treatment ponds or infiltration is shear failure of the slope into the river from added soil water pressure and noted this continues to be researched.

M. Hicks reiterated that the numbers appear to push the project into an individual USACE permit and that the combination of section 10 (believe 1 acre in CT River) and 404 (at 3 acres) impacts affect how to come up with a rational basis for splitting the project and to convince USACE.
Note: Subsequent to the meeting, M. Hicks discussed the project with J. Evans on February 21, 2017 and corrected his original conclusion regarding the anticipated section 10 impacts. M. Hicks indicated during this phone conversation that section 10 is only applicable to navigable tidal waters and as this section of the CT River is non-tidal and has limited navigability due to numerous downstream dams, the 1 acre section 10 limit requiring an individual 404 permit was not applicable in this case. During this conversation M. Hicks confirmed that in order for the project to qualify for coverage under the NH Programmatic General Permit, the total permanent and temporary impacts within Army Corps jurisdiction would need to be less than 3 acres. M. Hicks also confirmed during this conversation that given the support for PGP coverage expressed by M. Kern during the meeting, if the project impacts were revised to total less than 3 acres, he felt the project would qualify for PGP coverage and thus would not require an individual 404 permit.

This project has been previously discussed at the 4/18/2007, 8/20/2008, 5/20/2009, 10/29/2009, 4/21/2010, 6/16/2010, 1/20/2016, and 3/15/16 *Monthly Natural Resource Agency Coordination Meetings.*

Nashua-Merrimack-Bedford, #13761 (IM-0931(201))
This project involves widening approximately 7.5 miles of Everett Turnpike from two lanes to three in each direction. The purpose of this agenda item was to discuss the ongoing alternatives analysis of the Pennichuck Brook and Baboosic Brook crossings.

Pennichuck Brook Alternatives 2, 4, 5, 6, and 7 had been discussed at the October 19, 2016 meeting, and it was agreed they could be eliminated from consideration.

Alternative 3 would maintain the existing turnpike centerline but would also require a temporary bridge to construct. The temporary impacts and costs would be higher than the corresponding versions of Alternative 1 without other benefits. It was agreed Alternative 3 could be eliminated from further consideration.

Alternative 1 involves a 14-foot shift of the centerline. There are four versions of Alternative 1: 2:1 side slopes, 1.5:1 side slopes, retaining walls, and retaining walls with "net zero" impacts below ordinary high water (OHW). The NHDOT would prefer not to construct retaining walls, due to their higher construction cost and long-term maintenance costs. The 2:1 slope option would have greater impact below OHW but

NHDOT 14747 Walpole Charlestown April 19, 2017 Natural Resources Conference Report

DRAFT

Sam Fifield began the meeting with a general description of the project noting that the existing pavement of NH 12 ranges from 22 feet to 24 feet wide with no shoulders and that the proposed project will widen NH 12 to 11 foot wide travel lanes with 4 to 5 foot wide shoulders. As the new design widens the roadway west to avoid the New England Central Railroad (NECR), the project proposes to reconstruct the bank of the Connecticut River. Reconstructing the riverbank slope will stabilize the slope and eliminate a potential slope failure. The proposed riverbank slope will consist of exposed stone for the portion located at an elevation of 2-feet above the ordinary high water (OHW) to the toe of slope under water. The riverbank slope will also consist of stone covered with 6 inches of humus and native foliage for the upper portion of the slope located at an elevation above 2-feet above OHW. At the last Natural Resource meeting in February, the proposed slopes shown in the southern segment were 1.5H:1V. The design has been adjusted to eliminate the previously proposed temporary bench and creates slopes that range from 1.75H:1V to 2H:1V that allows the contractor to construct the slope without the temporary bench. This modification also allows the design to reflect actual construction conditions and impacts, as the previously proposed temporary construction bench would most likely have caused permanent impacts to the river.

Mike Hicks inquired about the total impacts below OHW, including both temporary and permanent, to determine if an Individual Permit is required from the Army Corp of Engineers (ACOE). Sam F confirmed that the project will be seeking an Individual Permit from ACOE since the total impacts beneath OHW exceeds three acres. In addition, Sam noted that the project will require a Water Quality Certification (WQC). She noted that the project increases the total area of impervious pavement by 2.3 acres and that treatment will be provided for approximately 7.3 acres. The proposed BMP is an infiltration stone bed located below the roadway that is fed by stone infiltration trenches adjacent to the paved shoulders. Sam F also noted that Greg Comstock (DES) has been consulted about the BMP.

Lori Sommer inquired about Operation and Maintenance (O&M) of this type of BMP. Sam F answered that based on her research the O&M would be to scrape off the top 6-12 inches of the infiltration trench every 10 years or so when the roadway is resurfaced and or when the guardrail requires replacing. Laurie S commented that this would be a good project for long-term monitoring. Tom Cleary noted that the proposed BMP would be similar to porous pavement.

Carol Henderson asked if this BMP had been tried before and how it might differ from porous pavement. Porous pavement needs to be vacuumed frequently for O&M. Sam answered that the voids within the proposed stone trench would be much larger than within porous pavement so O&M could be much less frequent.

Mike H inquired about the total square footage of impact below OHW. Don Lyford noted that he believed that regulatory limit for this location would be 3 acres and Sam F noted that the design exceed that limit. Matt L confirmed that the total impacts below OHW are approximately 151,686 square feet (3.48 AC). Tom C noted that the toe of slope in the southern segment does not go beyond the previously proposed limit of temporary impact associated with the previously proposed construction bench.

Mike H inquired whether any of the work could be classified as maintenance work. Matt L noted that was not the case, and that the majority of work is slope work.

Matt Urban referred to the draft impact table, which had been distributed to the panel, and inquired of DES whether or not the portion of the bank above OHW (that is proposed to be vegetated) could be considered self-mitigating. He noted that if that was the case then removing that length from mitigation requirements would save the project approximately 1.3 million in ARM Fund fees. Lori S stated that she would bring that question back to the DES Wetlands Bureau for discussion. She noted that if DES agreed that reestablishing the vegetated growth is self-mitigating then it is likely that 3 to 5 years of monitoring would be required to make sure vegetative growth is established and reminded the Design team that this condition should be a budget consideration. Matt U stated that it is likely that they would submit the wetlands applications without this mitigation concurrence and Lori S stated that this would be acceptable. Matt U also suggested that this would be acceptable mitigation for riprap within the river and Lori agreed.

Lori S inquired as to how the southern slope would be constructed. Tom C responded that a narrow access road would likely be constructed above OHW elevation within the limits of the proposed slope work and that the bottom portion of the proposed stone slope located under water would then be built from that access road. Once the bottom portion of the slope is built the upper portions can be incrementally built.

Carol H inquired whether this proposed slope work would impact the hydrology of the Connecticut River. Sam F stated that this was likely and that hydrology was still being evaluated. She also noted that a Conditional Letter of Map Revision (CLOMR) and a formal Letter of Map Revision (LOMR), through FEMA, would likely be required for the area within the project limits.

Mike H inquired as to the width of the river in the project area. Sam H brought up an aerial image of the Connecticut River and Meanys Cove and the width of the river was discussed.

Matt L noted that the proposed northern Connecticut River armored slope can be constructed from the existing roadway.

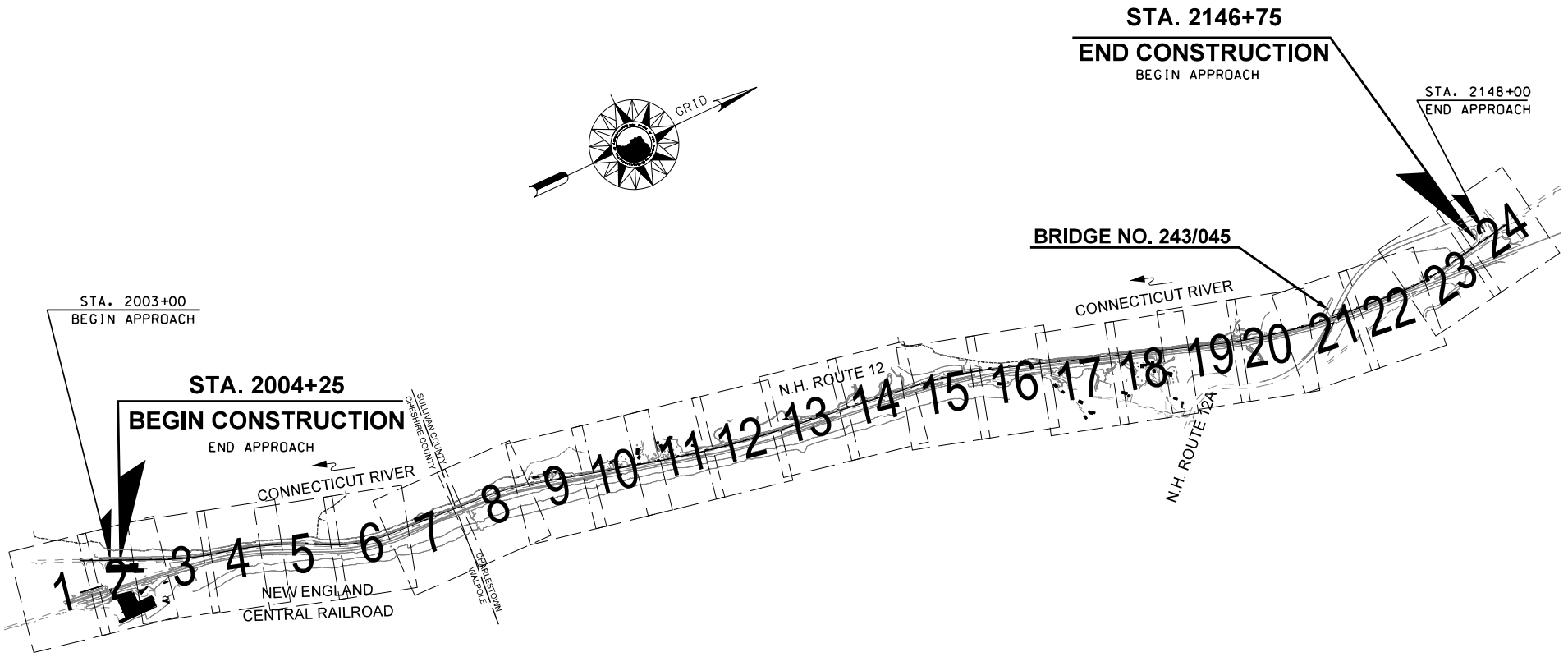
Lori S inquired what other water quality treatment measures were considered. Sam F responded that the Department had previously looked at constructing formal BMPs in the southern segment of the project. However, the opportunities were limited due to the lack of available area, unsuitable soils and slope stability issues. For the current design, the Department looked at using an open graded friction course on the full width of the pavement. However, this pavement has longevity issues and high maintenance costs. The Department also looked at installing porous pavement shoulders. However, construction costs would have been exceedingly high and this type of BMP requires continuous maintenance. And lastly the Department looked at constructing a standard wet extended basin (located in the flat field at the north end of Meanys Cove). However, while the basin could be sized to accommodate the project's treatment requirements only a fraction of the required pavement runoff could be diverted to this BMP. Don L noted that the design is currently proposing to treat three times the increase in impervious cover.

Lori H inquired whether the Department has met with the communities. It was noted that there will be an additional public meeting scheduled for some time in June of 2017. Matt U noted that at that time the Department would solicit input from the Towns for ARM Fund projects.

Amy Lamb stated that the latest NHB report noted some species and aquatic plants. Matt L provided an update noting that a dwarf wedge mussel survey had been completed in July of 2016 and that a survey for the Northern Bulrush was also completed at that time. Amy L then referred to the Stoney Bridge vegetative surveys that were completed in 2015 and noted that the Department should verify if the design impacts any of the areas noted. She stated that an additional plant survey will be needed if the new design impacts potential plant habitats. She stated that she can narrow down the limits of where plant surveys are needed if the Department provides her with the water depths in the areas outside of previously known impacts.

Carol H inquired as to when work might begin. Sam F responded that the clearing work might begin in December of 2017 or January of 2018. Carol H suggested that of the Department notify Fish and Game when construction starts since this is a popular bass fishing area.

Appendix H Wetland Impact Plans



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SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
Key	14747ACOEplans	14747	1	26

WETLAND IMPACT SUMMARY

WETLAND NUMBER	WETLAND CLASSIFICATION	LOCATION		AREA PERMANENT IMPACTS					TEMPORARY IMPACTS	COMMENTS
				N.H.W.B. (NON-WETLAND)	N.H.W.B. & A.C.O.E. (WETLAND)	BANK				
						LEFT	CHANNEL	RIGHT		
				SF	SF	LF	LF	LF	SF	
20	Bank	A	Walpole						9868	
1A	R2UB3	B	Walpole						12478	
20	Bank	C	Walpole	40883		1224				
1A	R2UB3	D	Walpole		48396		1239			
2	R4SB3	E	Walpole						183	
21	Bank	F	Walpole	63845		1502				
			Charlestown	16122		384				
1B	R2UB3	G	Walpole		72100		1475			
			Charlestown		7749		258			
1B	R2UB3	H	Walpole						14584	
			Charlestown						2654	
4	R4SB3	I	Walpole						349	
5A	R4SB3	J	Walpole						278	
7A	R4SB3	K	Walpole						699	
21	Bank	L	Charlestown						1318	
21	Bank	M	Charlestown						1328	
21	Bank	N	Charlestown	986		87				
8	R4SB3	O	Charlestown						115	
10B	PFO/PSS1E	P	Charlestown						1455	
10A	R4SB3	Q	Charlestown						579	
10C	PFO/PSS1E	R	Charlestown						280	
12	R4SB3	S	Charlestown						541	
12	R4SB3	T	Charlestown						217	
12	R4SB3	U	Charlestown		215	20	13	41		
1E	PF01E	V	Charlestown						3344	
1E	PF01E	W	Charlestown		111					
1E	PF01E	X	Charlestown		9058					
1E	PF01E	Y	Charlestown						1406	
1C	POW	Z	Charlestown						417	
1C	POW	AA	Charlestown						4011	
1C	POW	AB	Charlestown		867					
1E	PF01E	AC	Charlestown						32	
1C	POW	AD	Charlestown		2755					
1F	PSS1E	AE	Charlestown		1063					
1F	PSS1E	AF	Charlestown						2320	
1G	PSS1E	AG	Charlestown						420	
1G	PSS1E	AH	Charlestown		114					
1D	POW	AI	Charlestown						2134	
1D	POW	AJ	Charlestown		637					
1D	POW	AK	Charlestown						1454	
1D	POW	AL	Charlestown		1077					
1I	PSS/PF01E	AM	Charlestown						4149	
1I	PSS/PF01E	AN	Charlestown		41					
1I	PSS/PF01E	AO	Charlestown		1828					
1I	PSS/PF01E	AP	Charlestown		53					
1I	PSS/PF01E	AQ	Charlestown		20					
22	Bank	AR	Charlestown						511	
1A	R2UB3	AS	Charlestown						551	
22	Bank	AT	Charlestown	87		13				
1A	R2UB3	AU	Charlestown						378	
22	Bank	AV	Charlestown						2292	
22	Bank	AW	Charlestown	2438		206				
22	Bank	AX	Charlestown						651	
22	Bank	AY	Charlestown	6778		576				
1A	R2UB3	AZ	Charlestown						17843	
1A	R2UB3	BA	Charlestown		18734		1724			
13A	POW	BB	Charlestown						1096	
22	Bank	BC	Charlestown	8052		590				
22	Bank	BD	Charlestown	8791		553				
22	Bank	BE	Charlestown	340		68				
1J	PEM1E	BF	Charlestown						1305	
1J	PEM1E	BG	Charlestown		8					
1K	PF01E	BH	Charlestown		6444					
1K	PF01E	BI	Charlestown						2798	
15A	R2UB3	BJ	Charlestown						165	
15A	R2UB3	BK	Charlestown		485	37	36	37		
1K	PF01E	BL	Charlestown						1450	
15B	PEM1E	BM	Charlestown						138	
15A	R2UB3	BN	Charlestown						305	
15B	PEM1E	BO	Charlestown						186	
17B	PEM1F	BP	Charlestown						3805	
17B	PEM1F	BQ	Charlestown		155					
18A	PEM1E	BR	Charlestown						1372	
17D	POWH	BS	Charlestown						77	
17B	PEM1F	BT	Charlestown		891					

TOTAL IMPACTS FOR WETLANDS AND SHORELAND PERMITS

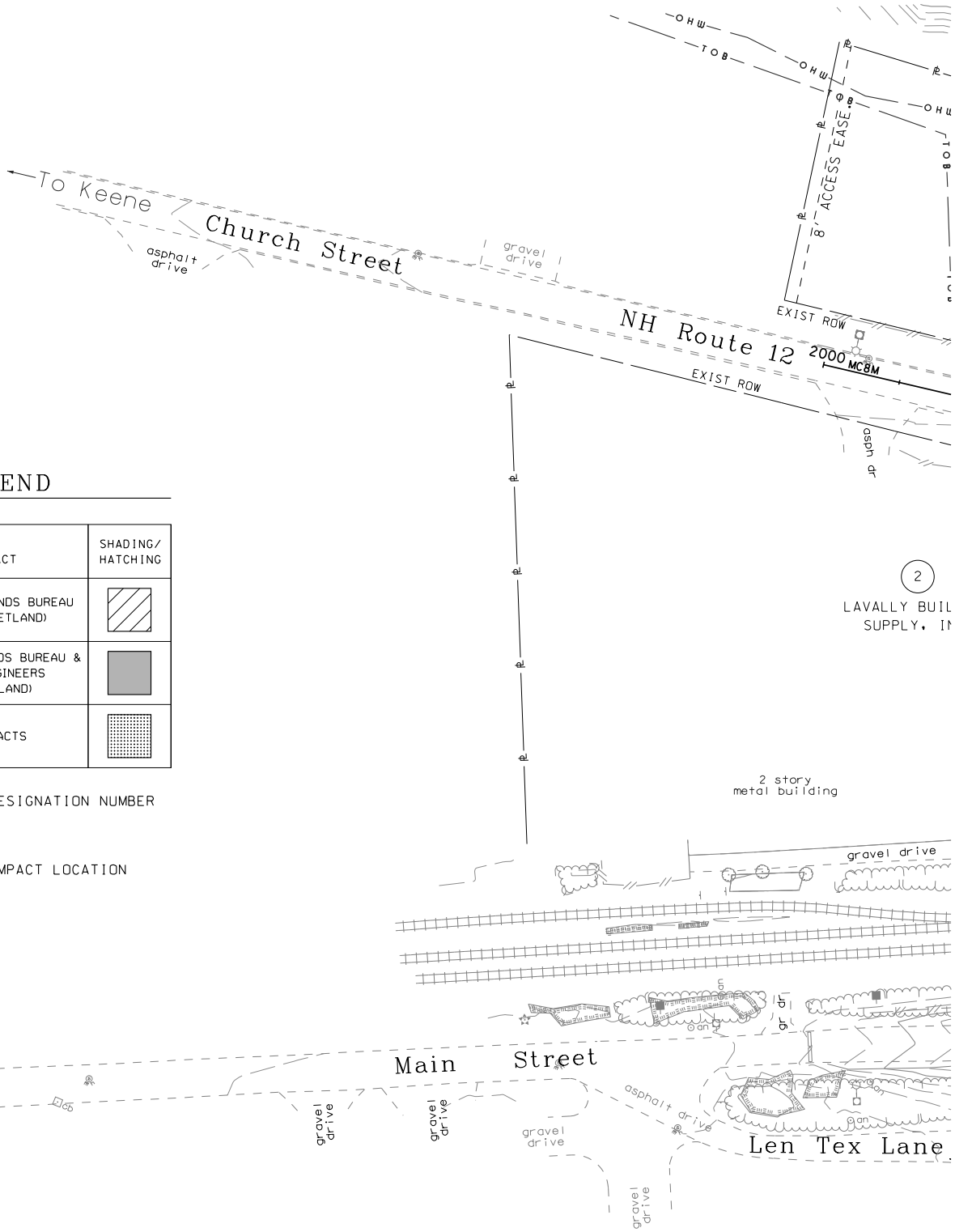
		WALPOLE	CHARLESTOWN	TOTAL
WETLAND IMPACTS				
PERMANENT NON-WETLAND IMPACTS:	148322 SF	104728	43594	148322
PERMANENT WETLAND IMPACTS:	172801 SF	120496	52305	172801
TEMPORARY IMPACTS:	101536 SF	38439	63097	101536
TOTAL IMPACTS:	422659 SF	263663	158996	422659
	9.70 AC.	6.05	3.65	9.70
STREAM IMPACTS				
PERMANENT IMPACTS TO LEFT BANKS:	5260 LF	2726	2534	5260
PERMANENT IMPACTS TO RIGHT BANKS:	78 LF	0	0	78
PERMANENT IMPACTS TO CHANNEL:	4745 LF	2714	2031	4745
TOTAL STREAM IMPACTS:	10083 LF	5440	4643	10083

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
Impacts	14747ACOEplans	14747	2	26



LEGEND

TYPE OF WETLAND IMPACT	SHADING/ HATCHING
NEW HAMPSHIRE WETLANDS BUREAU (PERMANENT NON-WETLAND)	
NEW HAMPSHIRE WETLANDS BUREAU & ARMY CORP OF ENGINEERS (PERMANENT WETLAND)	
TEMPORARY IMPACTS	

WETLAND DESIGNATION NUMBER

X WETLAND IMPACT LOCATION

100 0 100 200

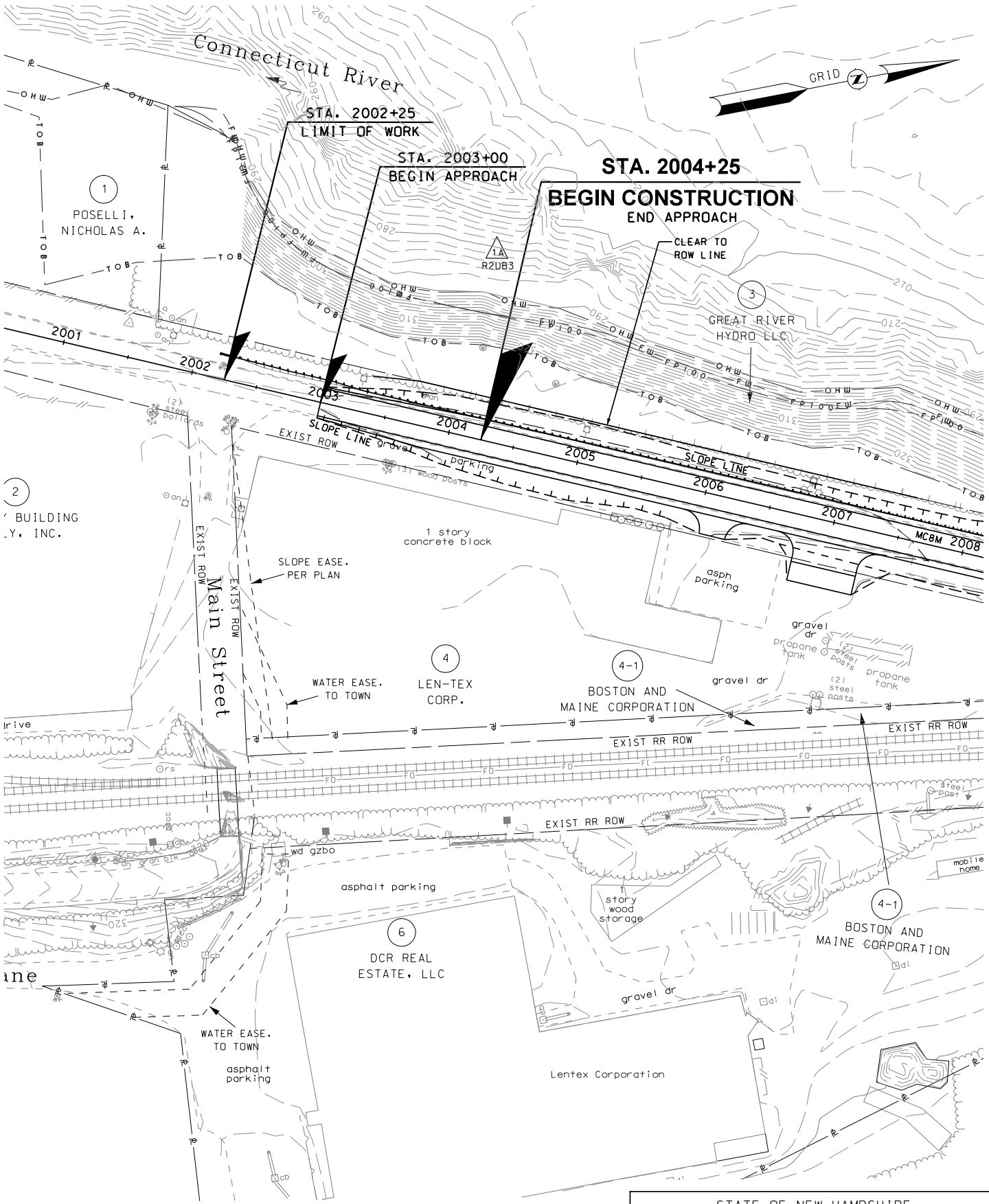
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE01	14747ACOEplans	14747	3	26



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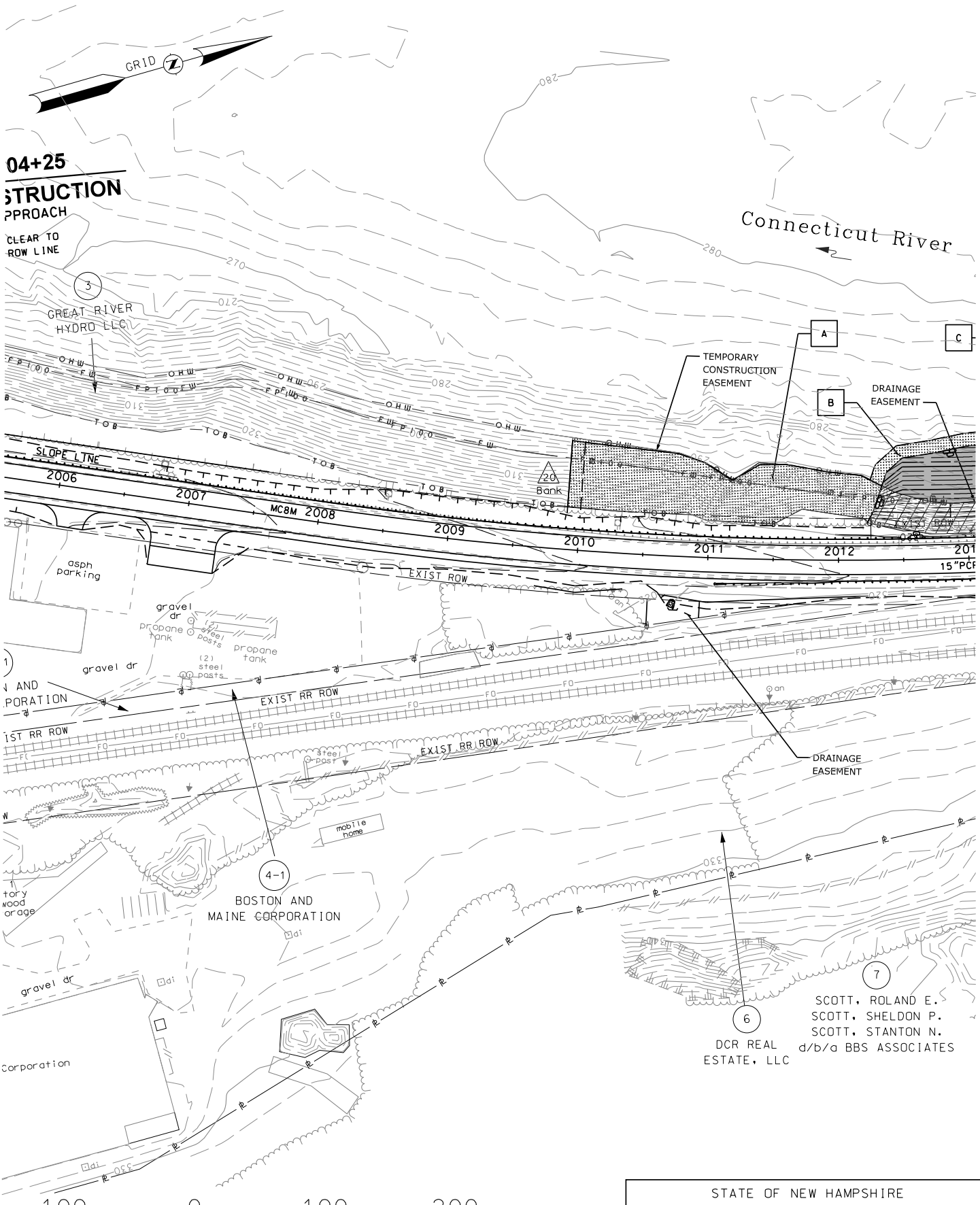
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE02	14747ACOEplans	14747	4	26



STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
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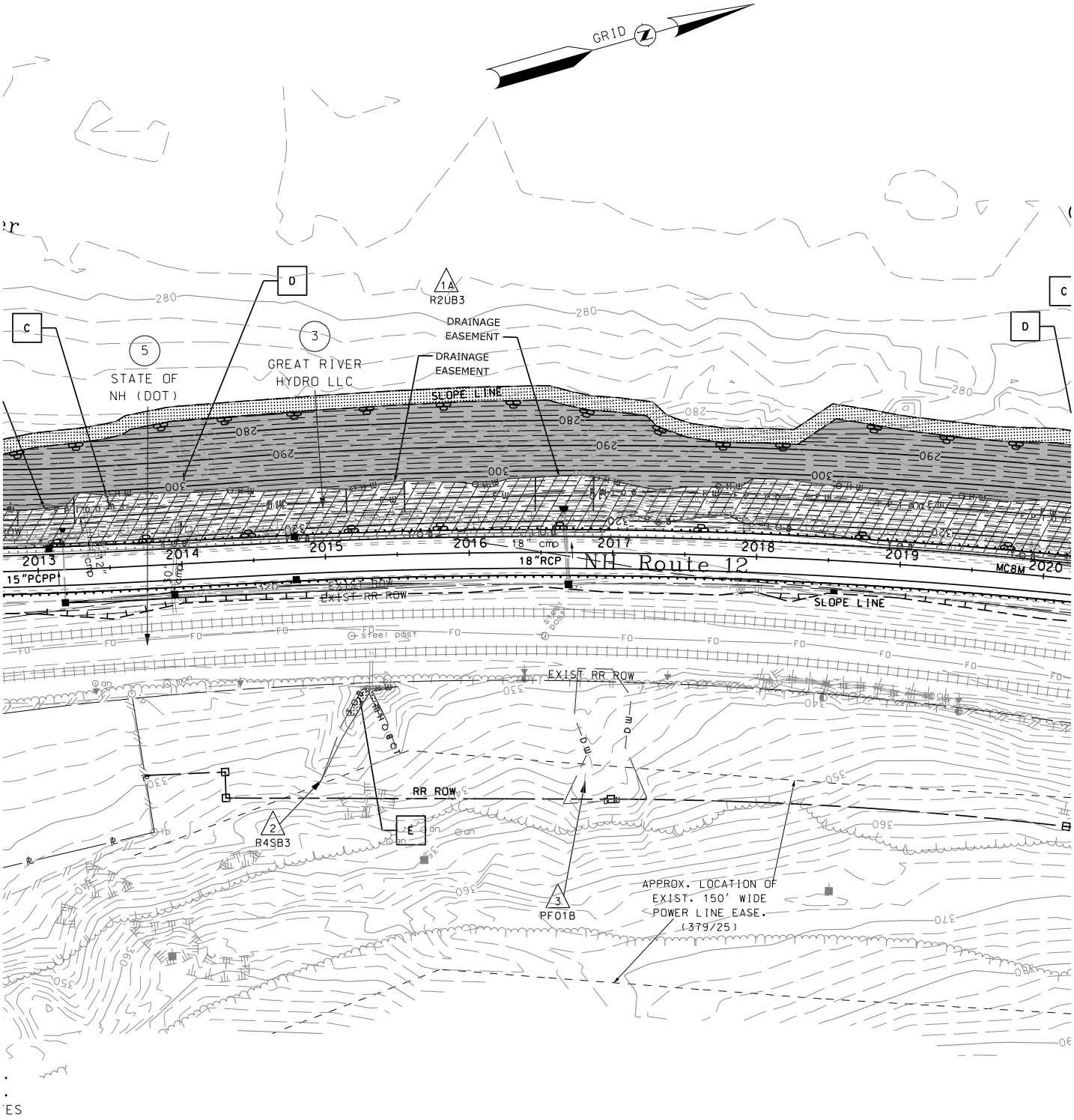

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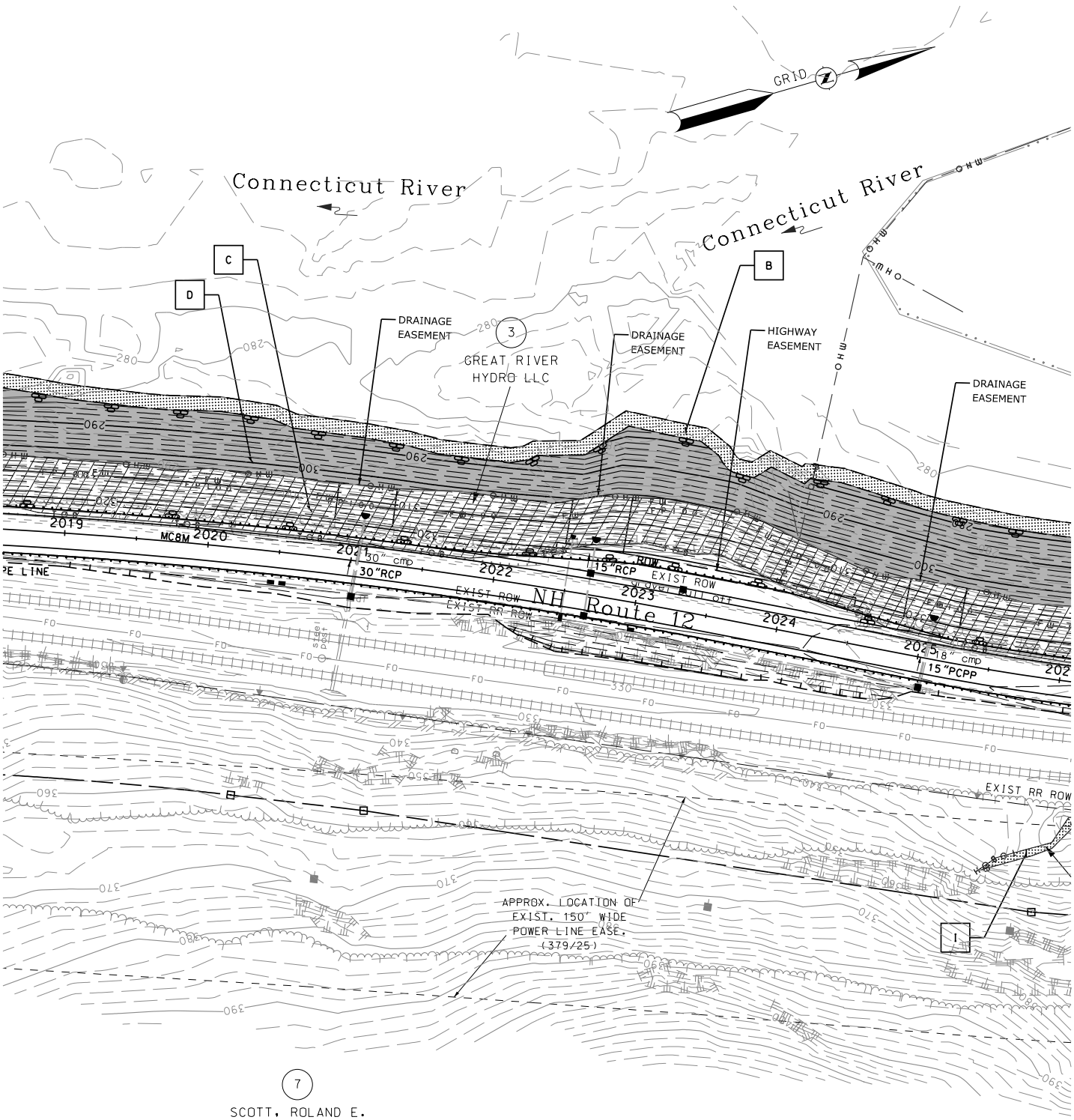
SCALE IN FEET

STATE OF NEW HAMPSHIRE				
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN				
NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN				
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE04	14747ACOEplans	14747	6	26



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SCOTT, ROLAND E.
SCOTT, SHELDON P.
SCOTT, STANTON N.
d/b/a BBS ASSOCIATES

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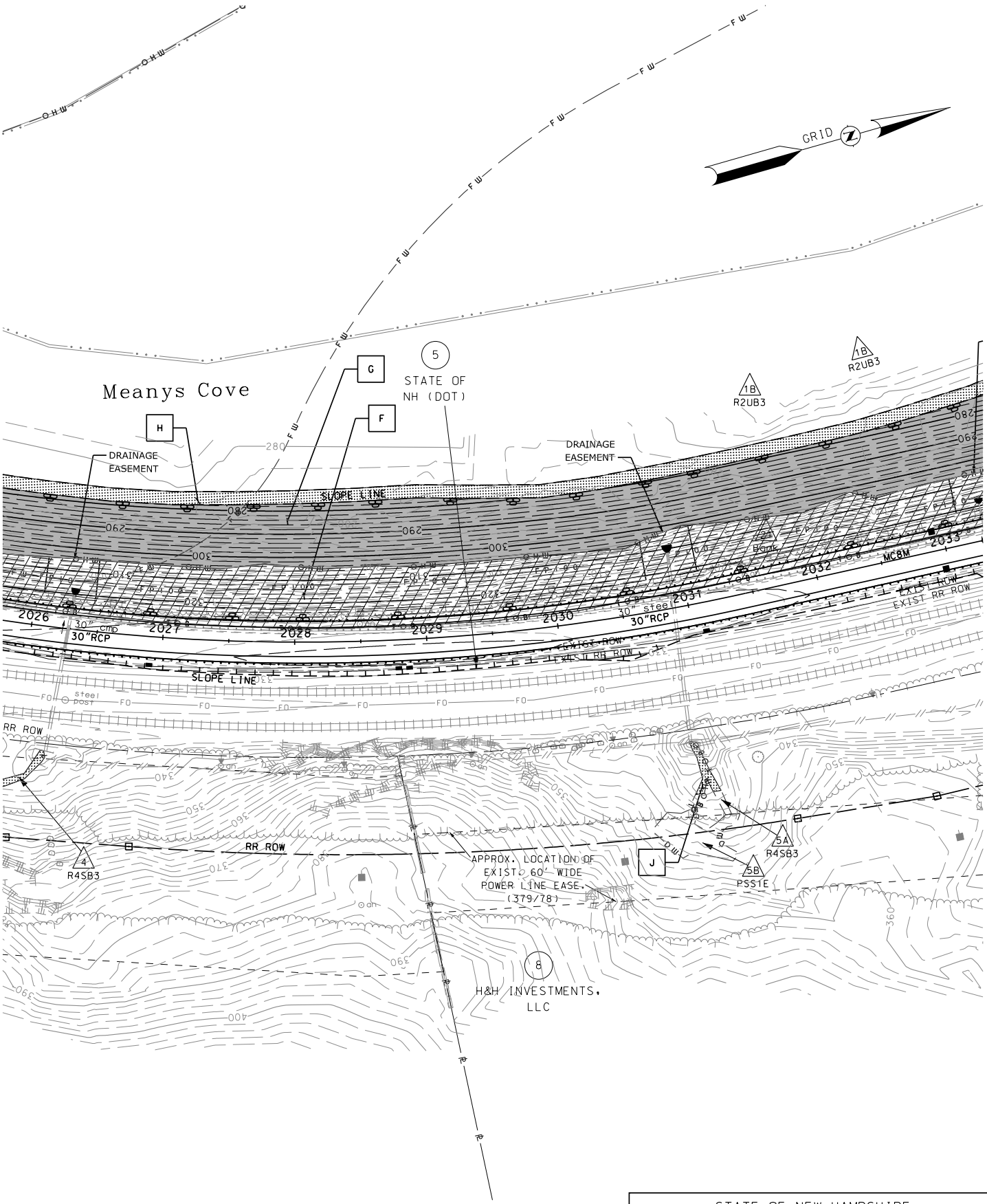
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE05	14747ACOEplans	14747	7	26



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SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
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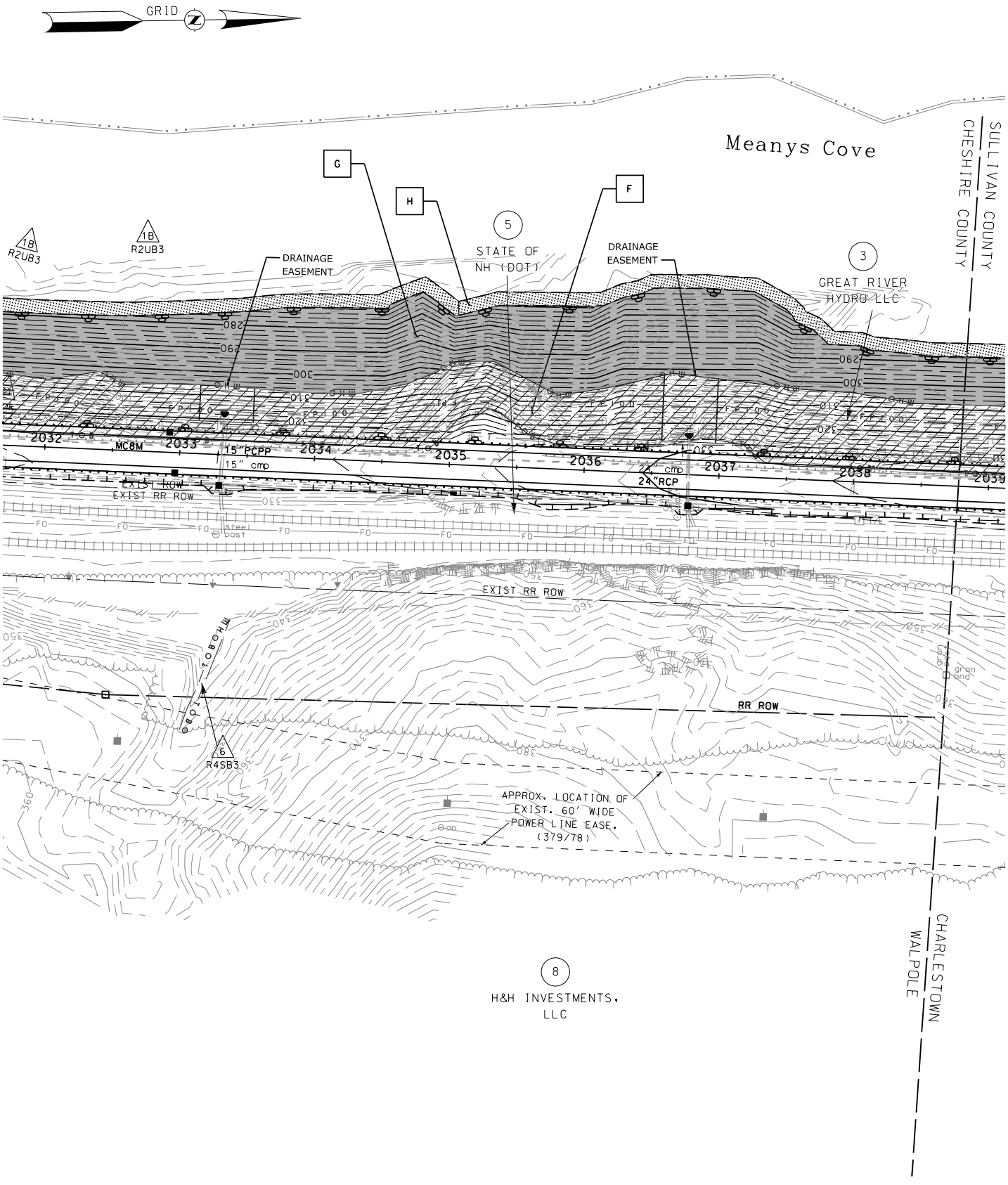

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SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
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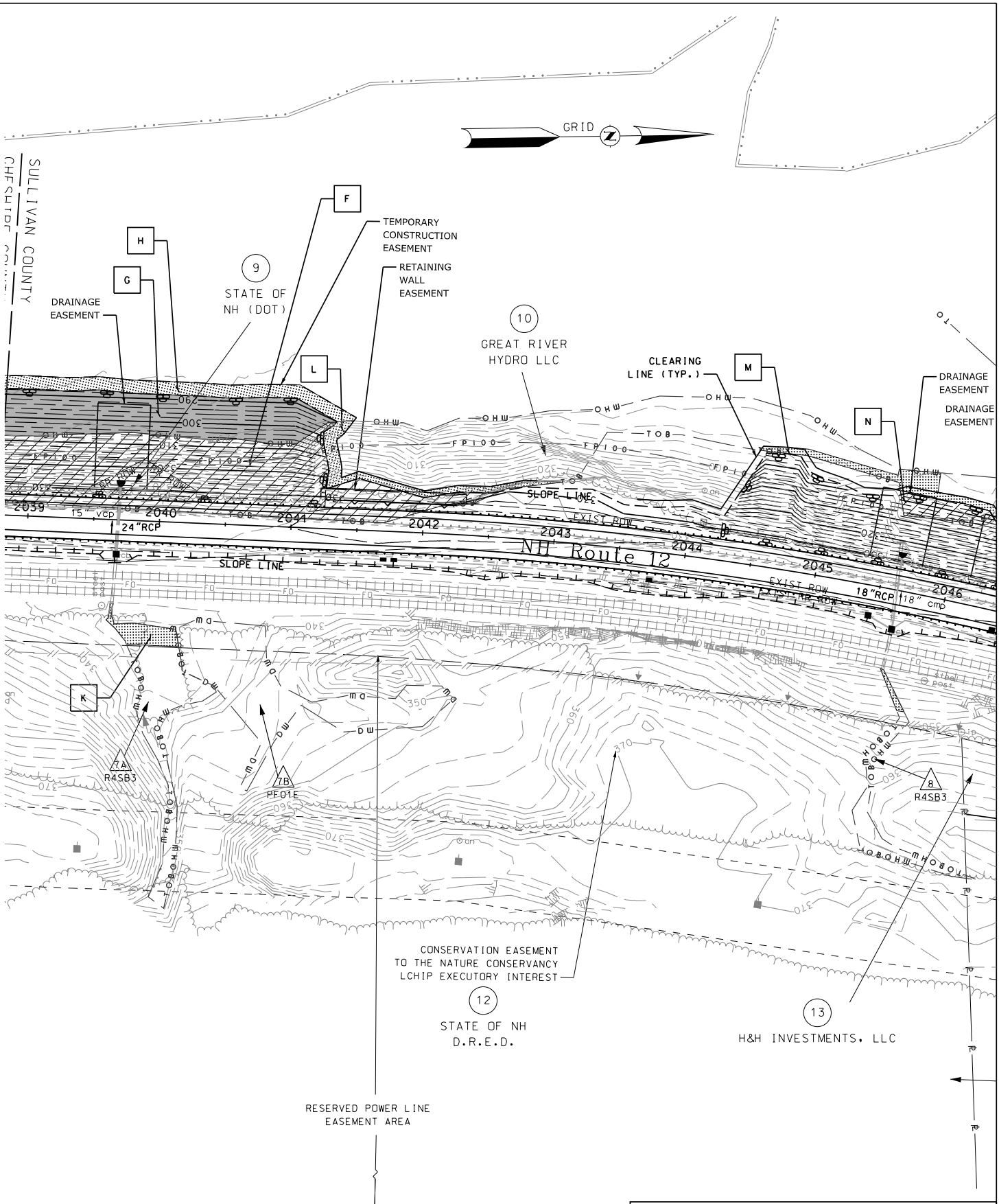
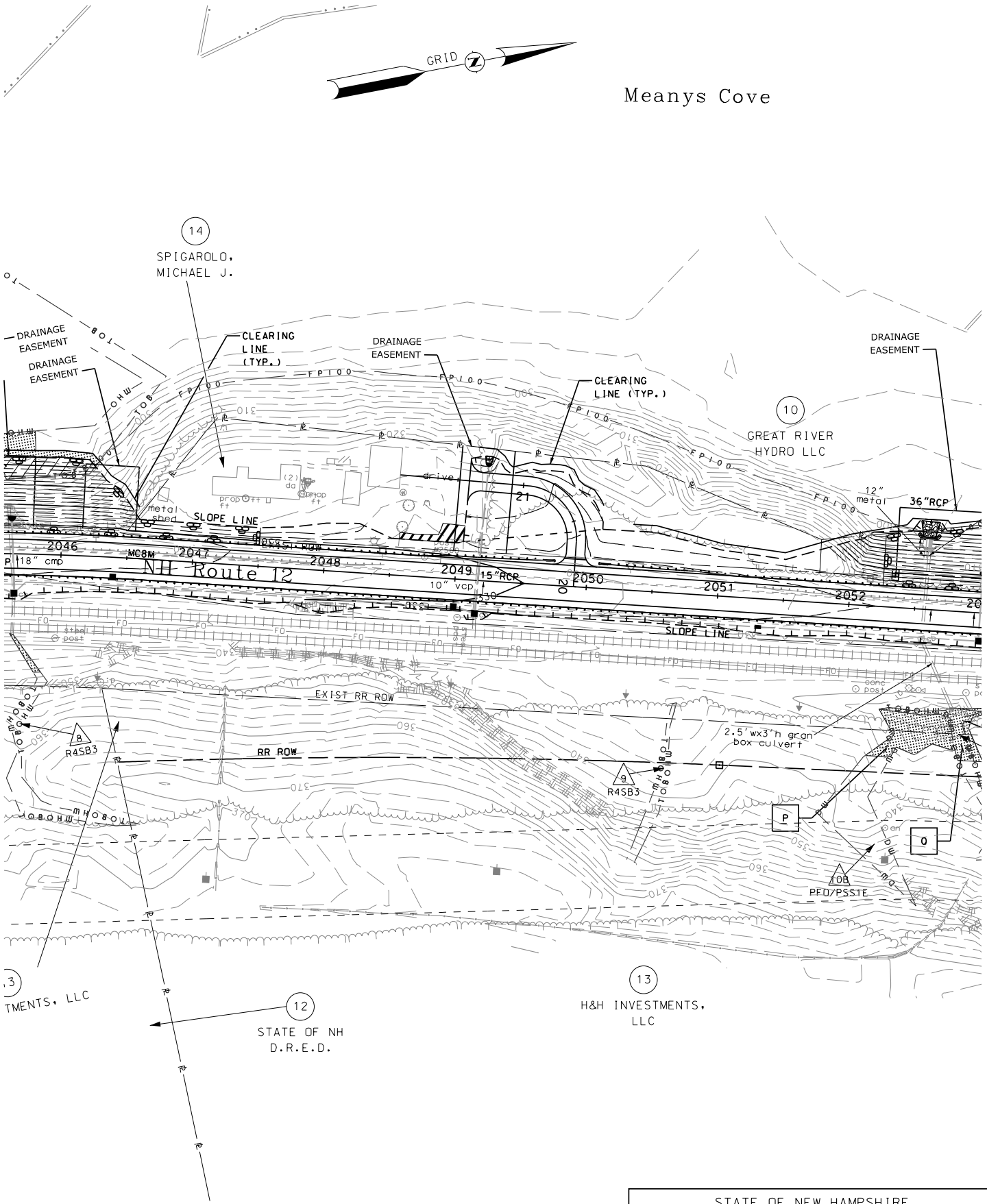


STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE08	14747ACOEplans	14747	10	26

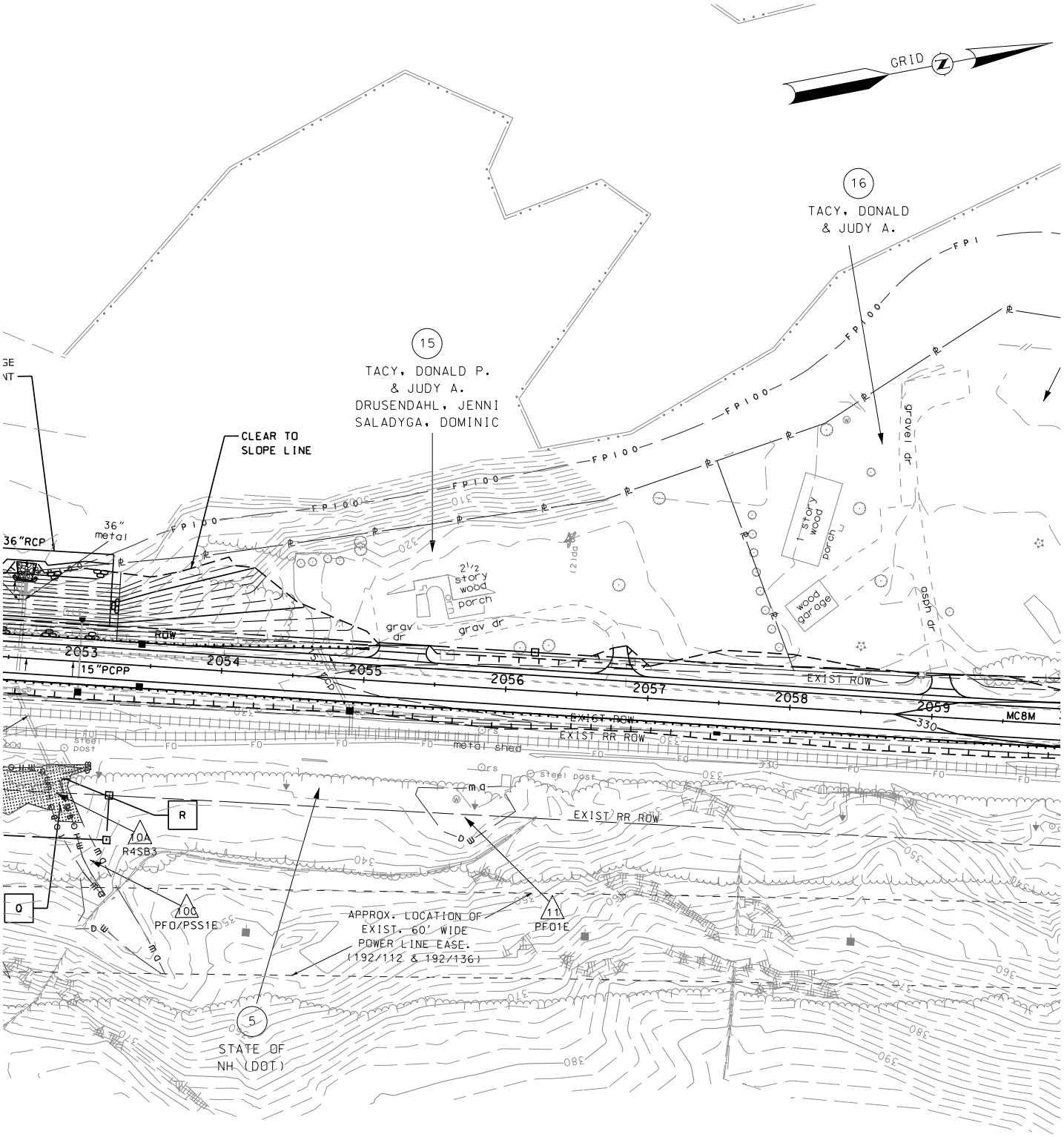


STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE09	14747ACOEplans	14747	11	26



100 0 100 200

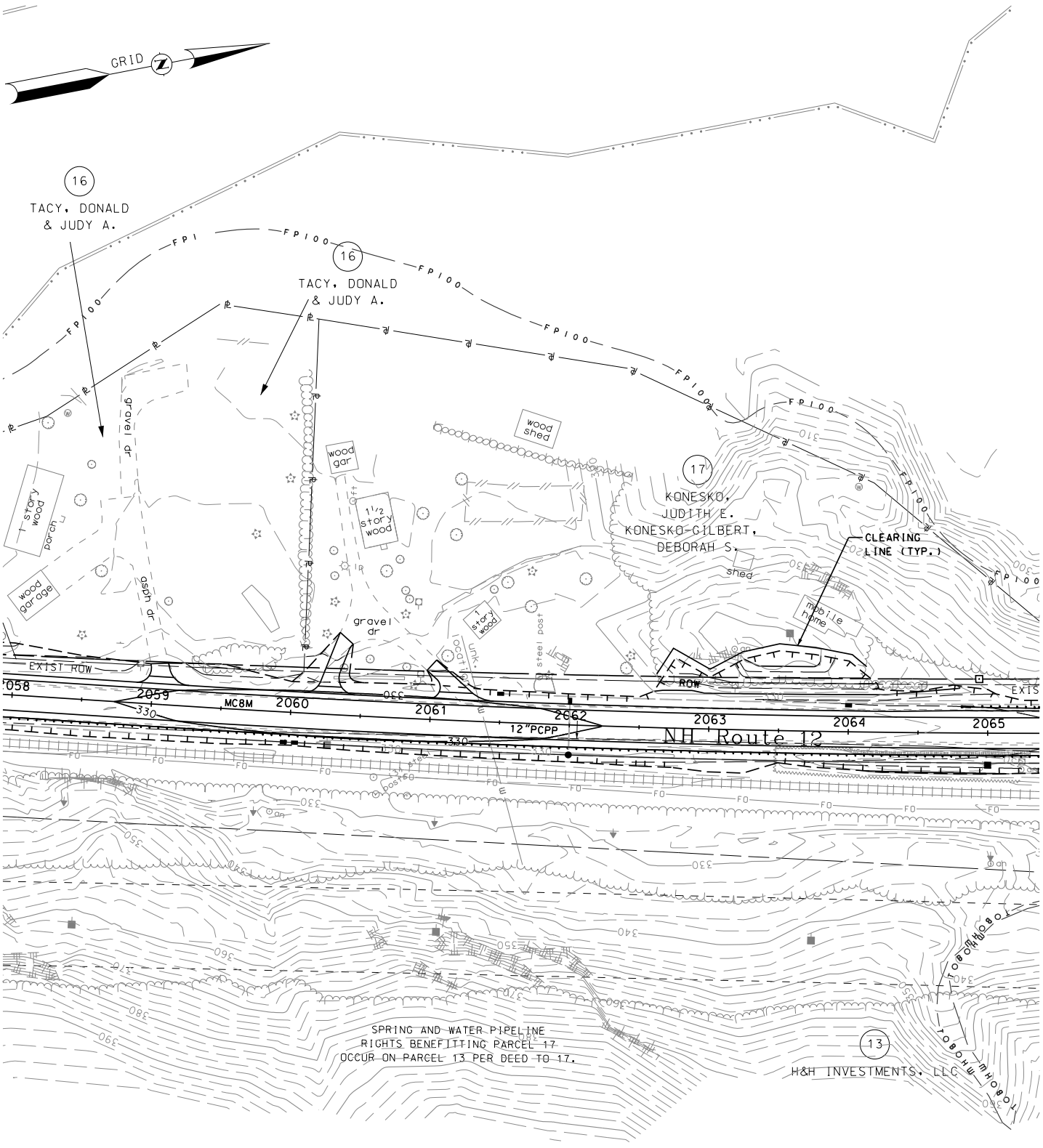
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE10	14747ACOEplans	14747	12	26



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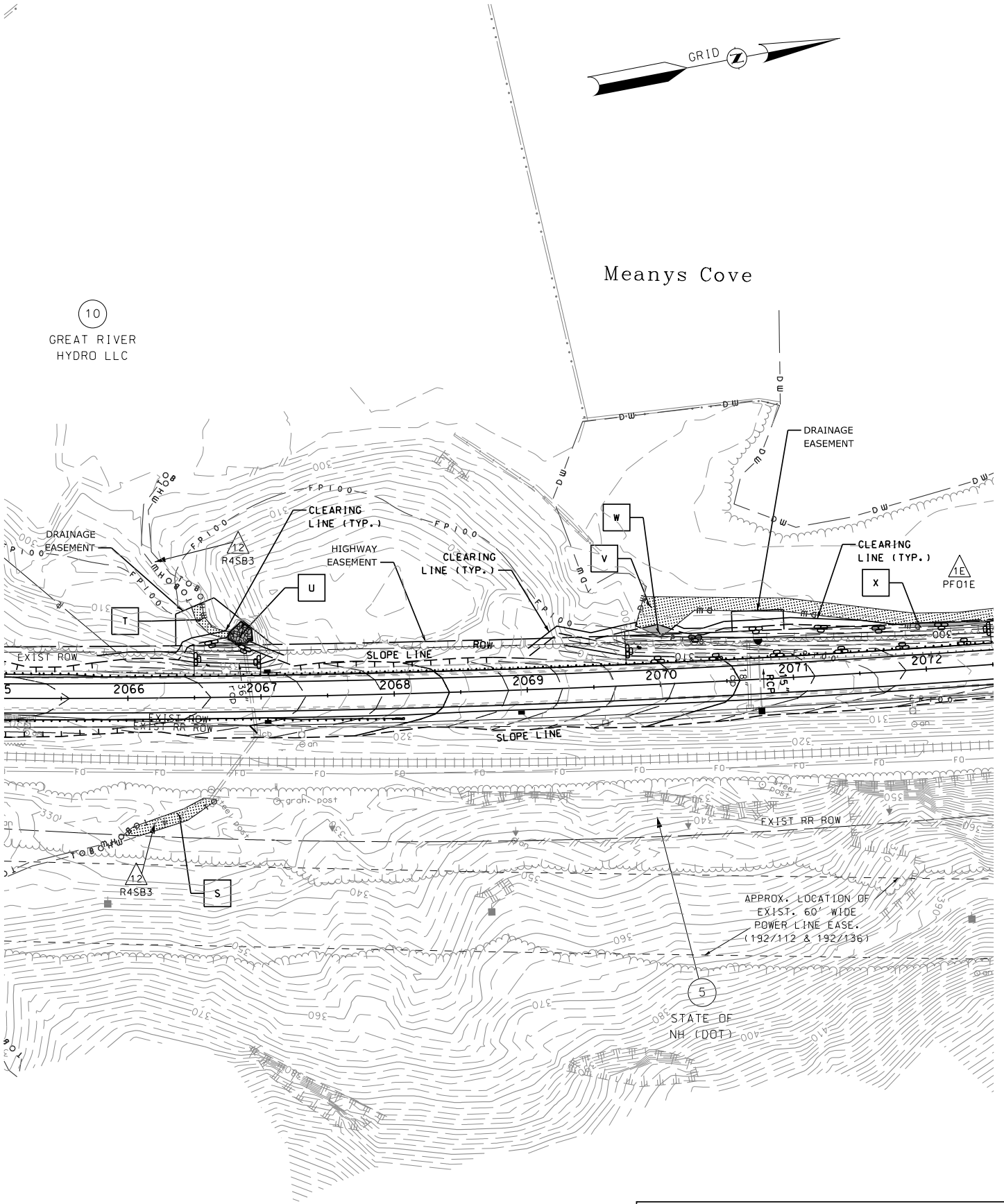
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE11	14747ACOEplans	14747	13	26



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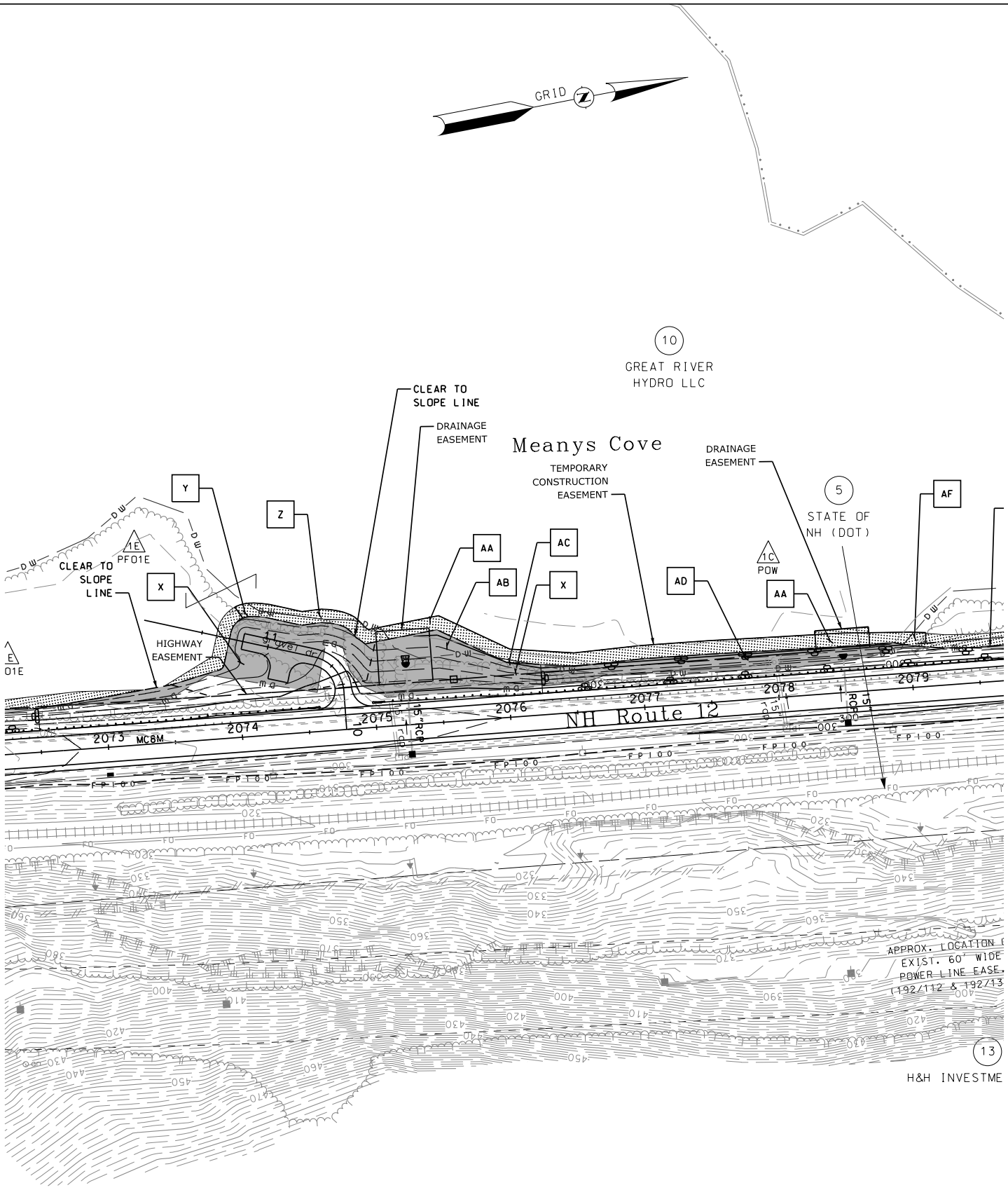
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE12	14747ACOEplans	14747	14	26



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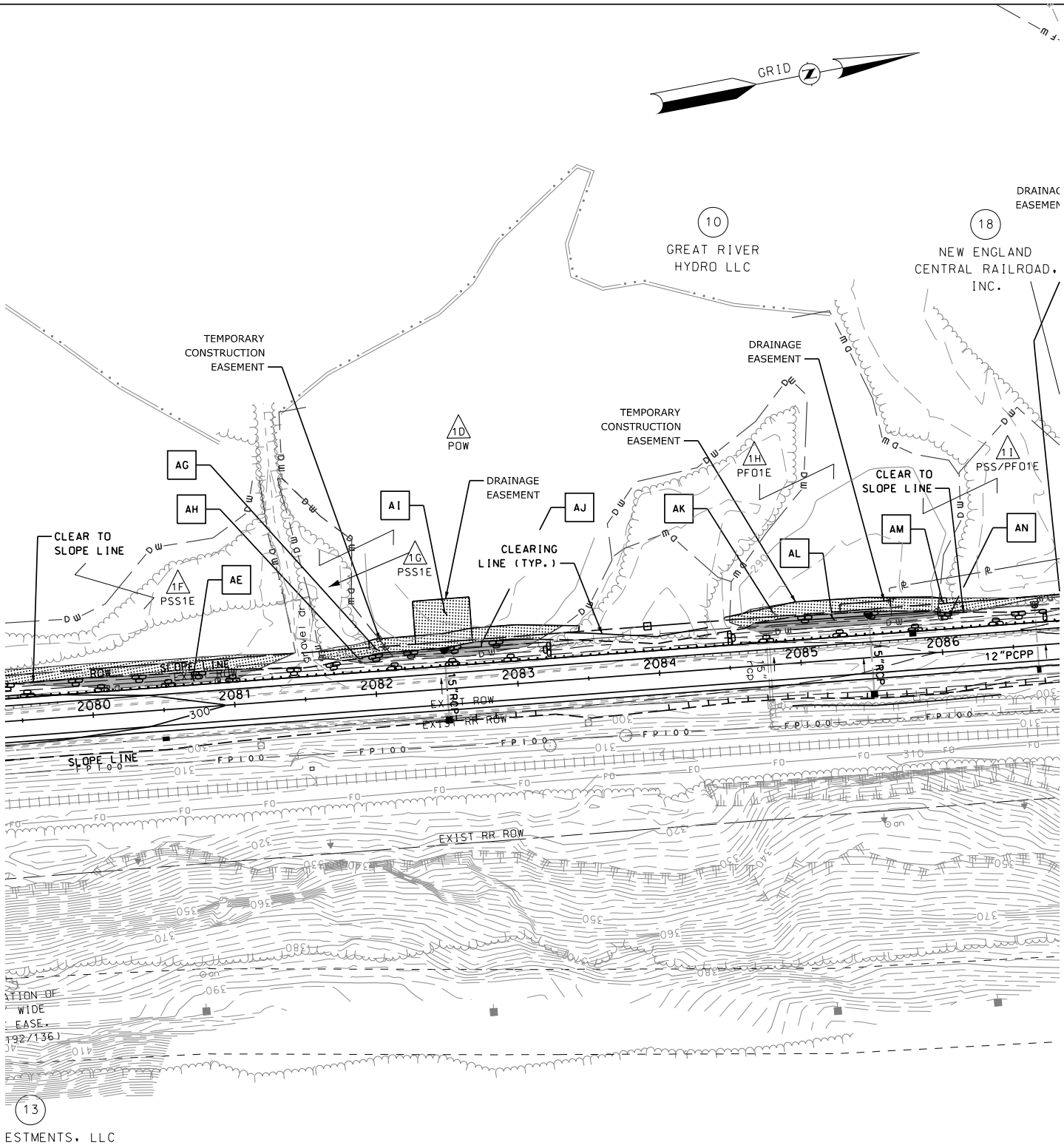
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE13	14747ACOEplans	14747	15	26



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SCALE IN FEET

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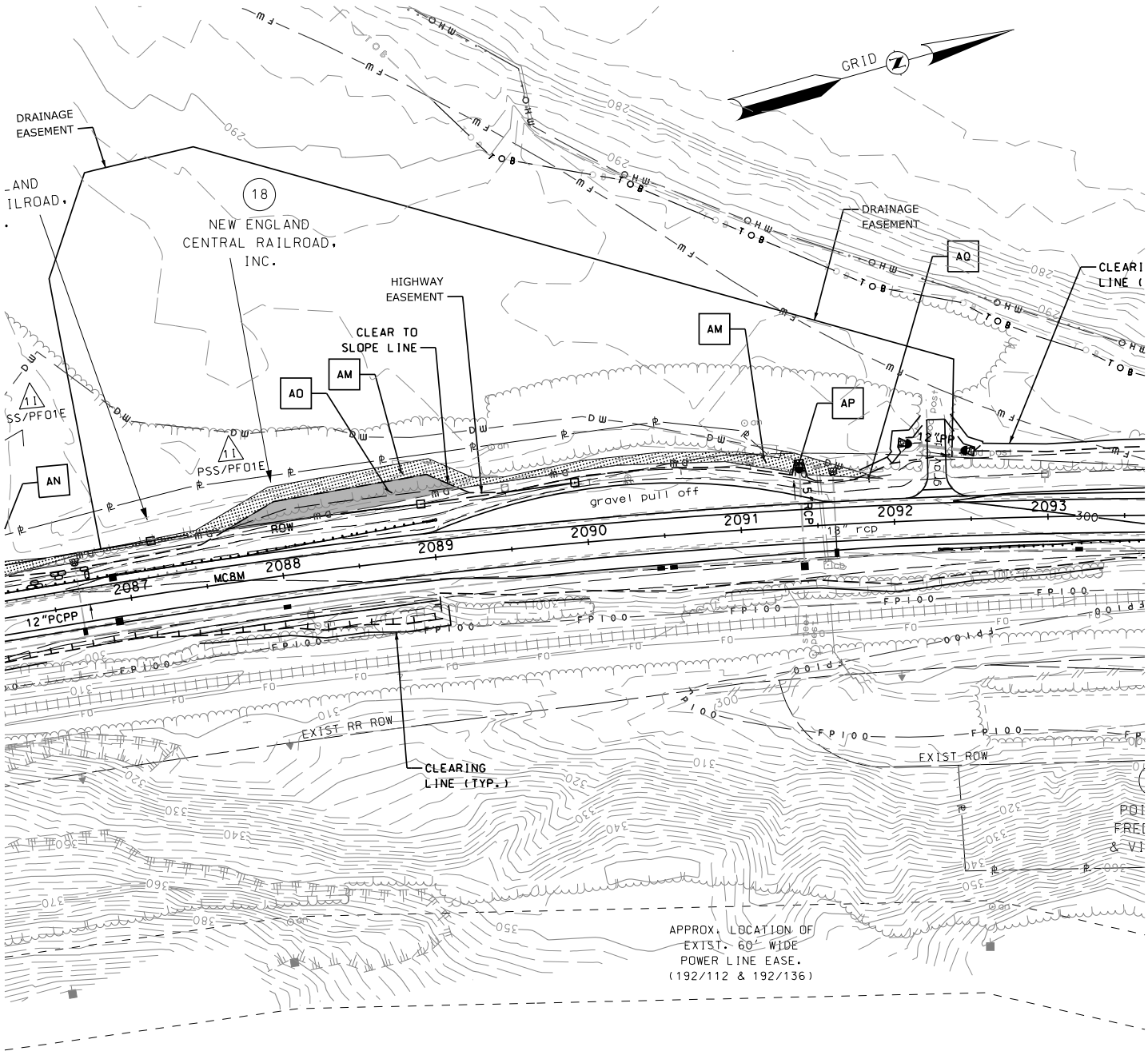
NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE14	14747ACOEplans	14747	16	26



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SCALE IN FEET

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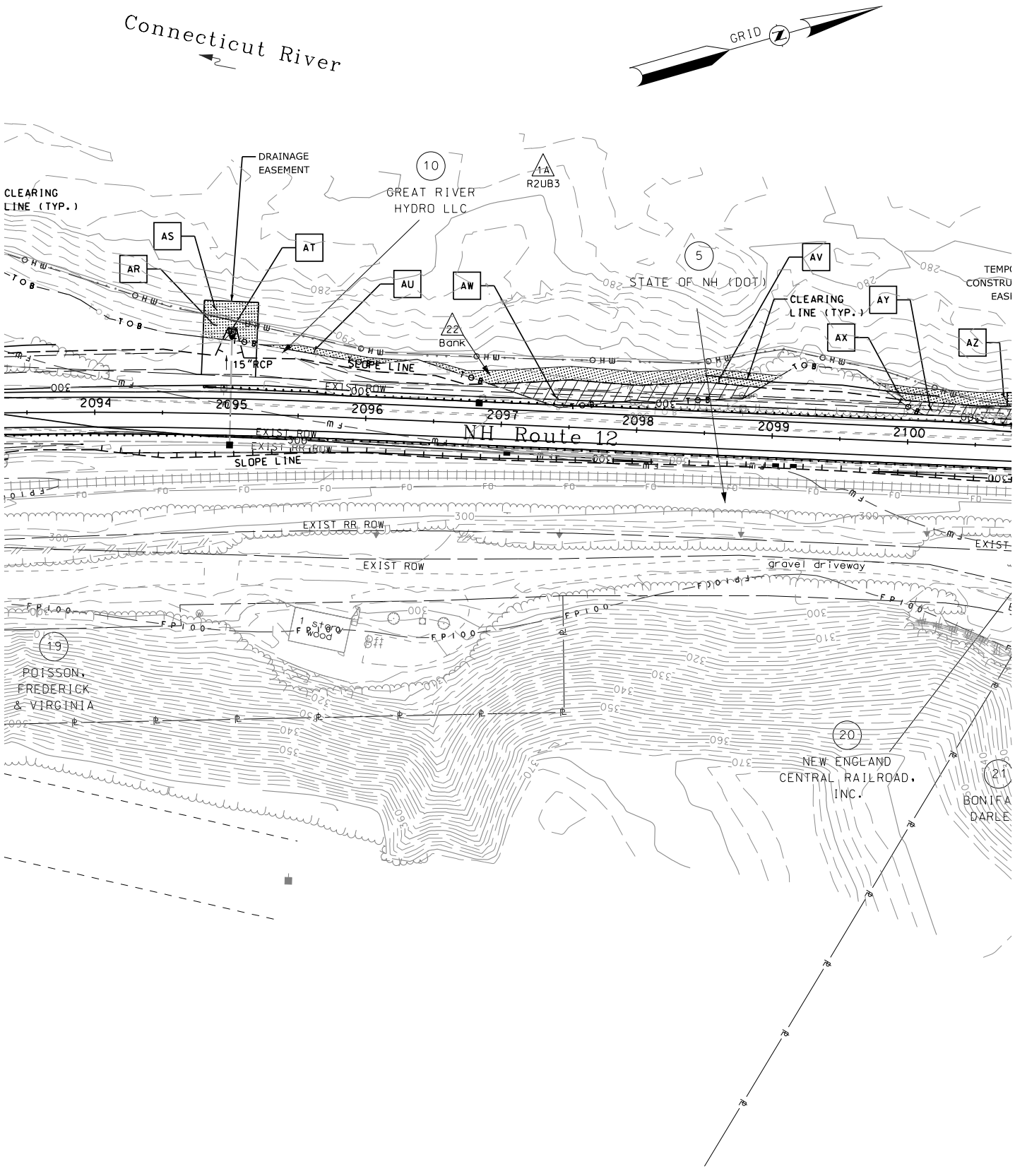
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE15	14747ACOEplans	14747	17	26



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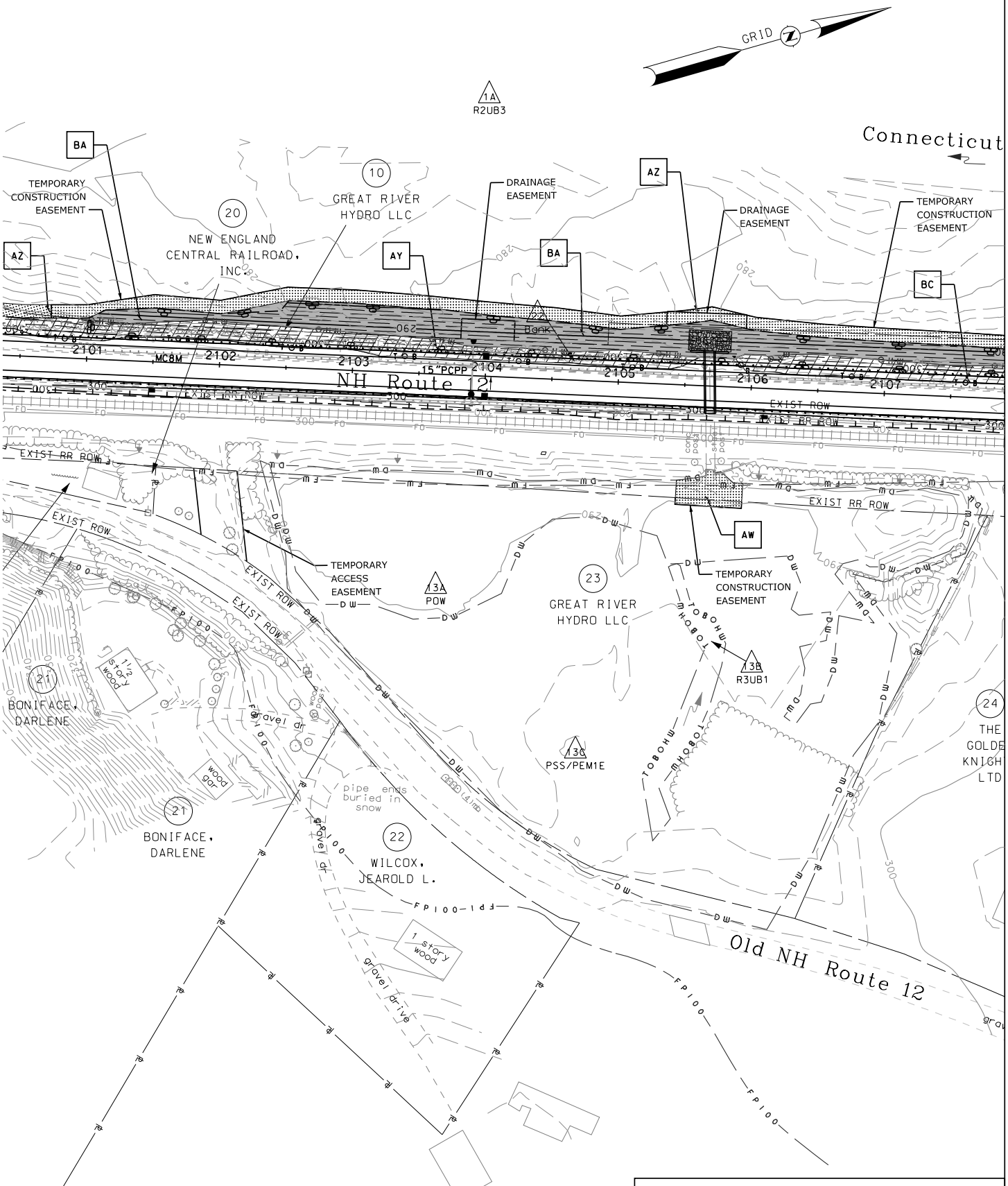
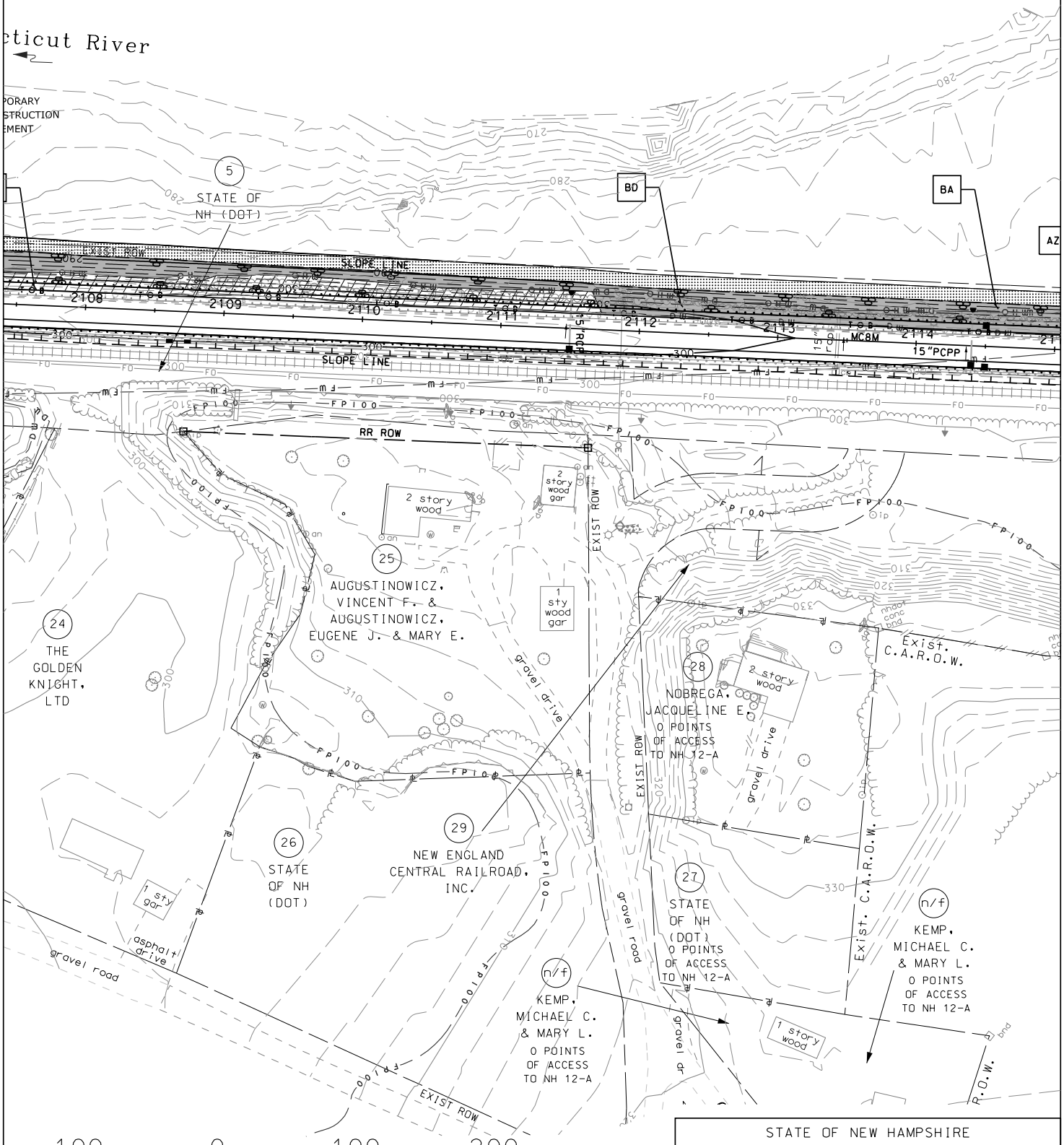
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

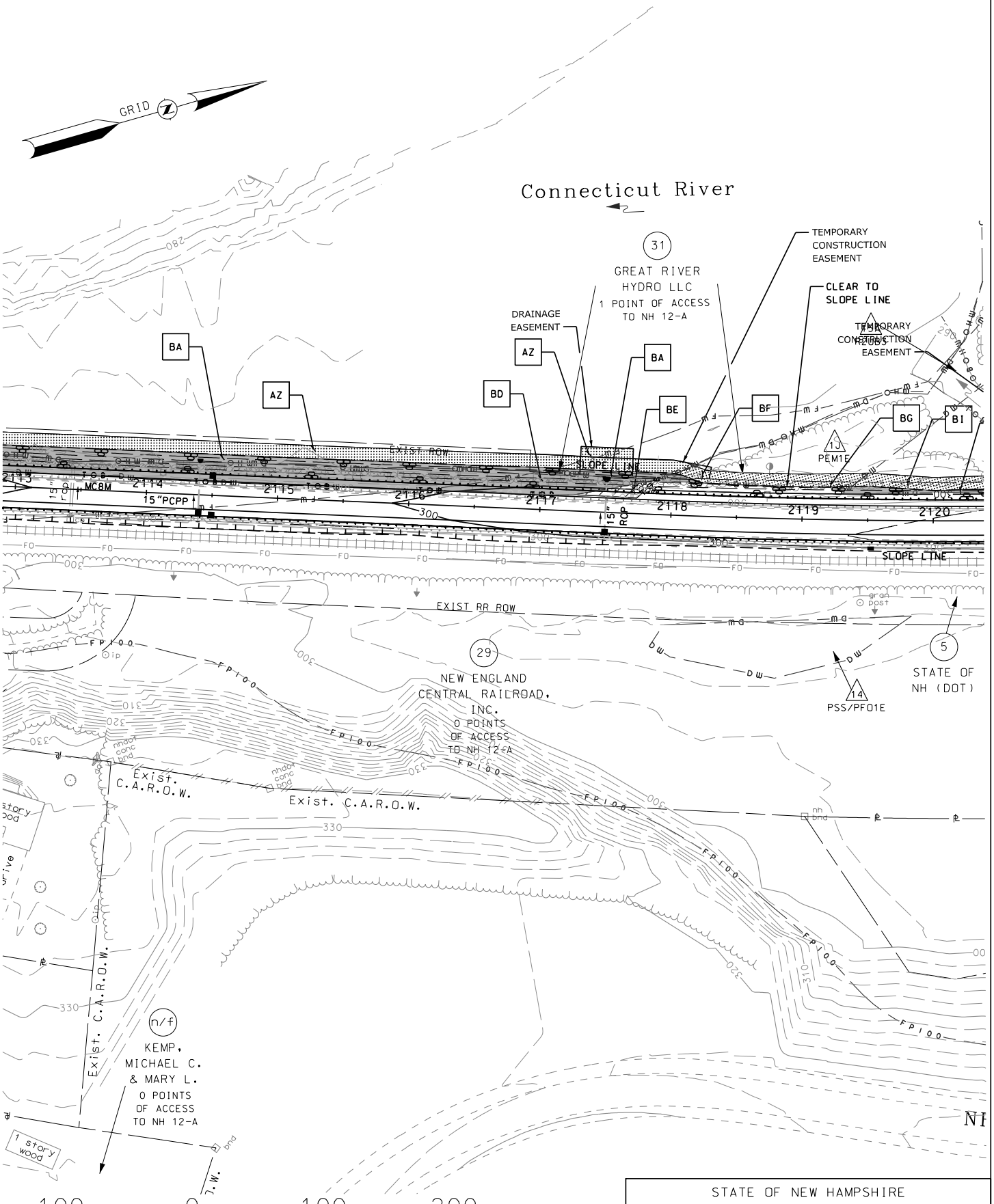
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE16	14747ACOEplans	14747	18	26



STATE OF NEW HAMPSHIRE				
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN				
NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN				
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE17	14747ACOEplans	14747	19	26



STATE OF NEW HAMPSHIRE				
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN				
NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN				
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE18	14747ACOEplans	14747	20	26



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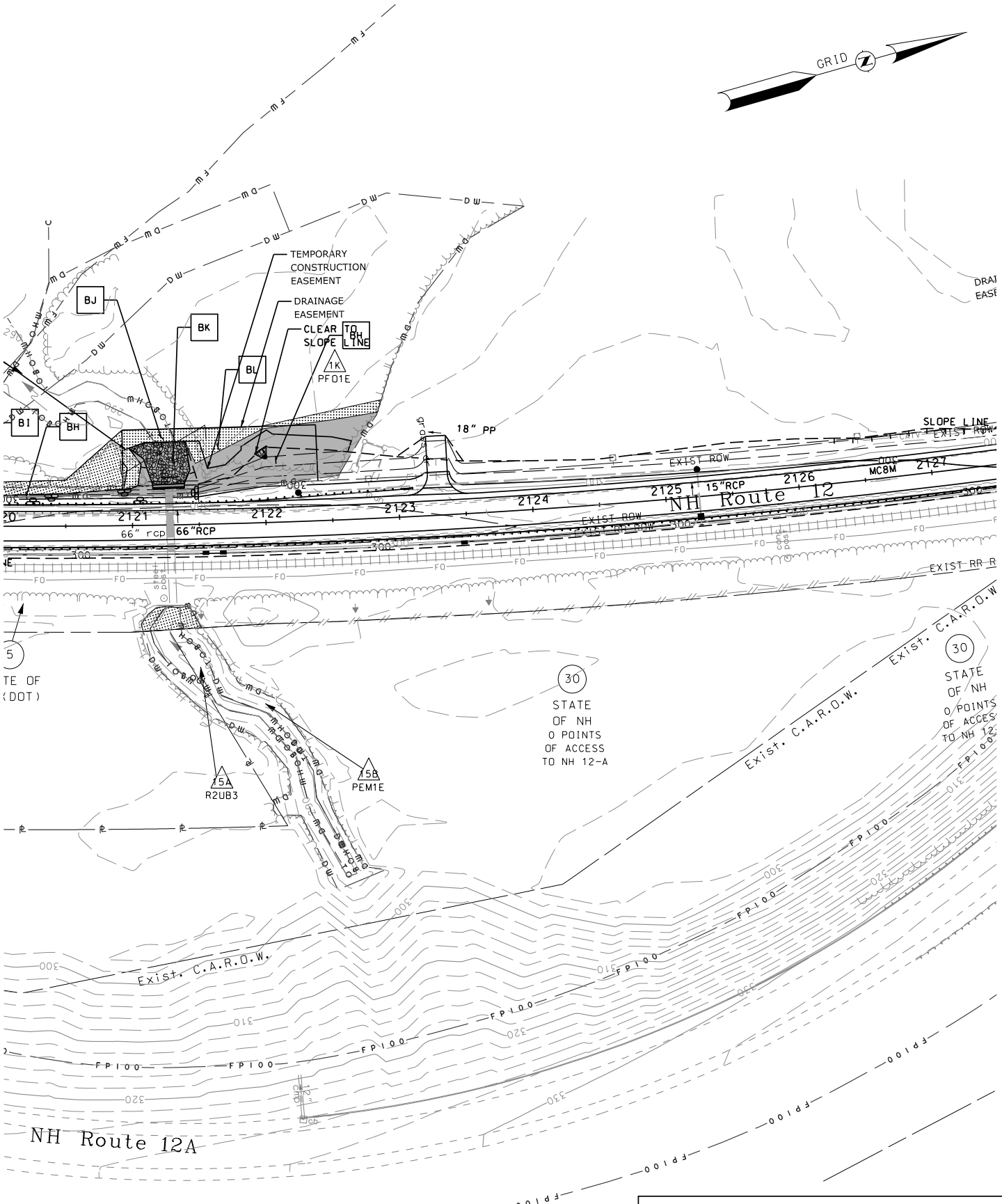
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE19	14747ACOEplans	14747	21	26



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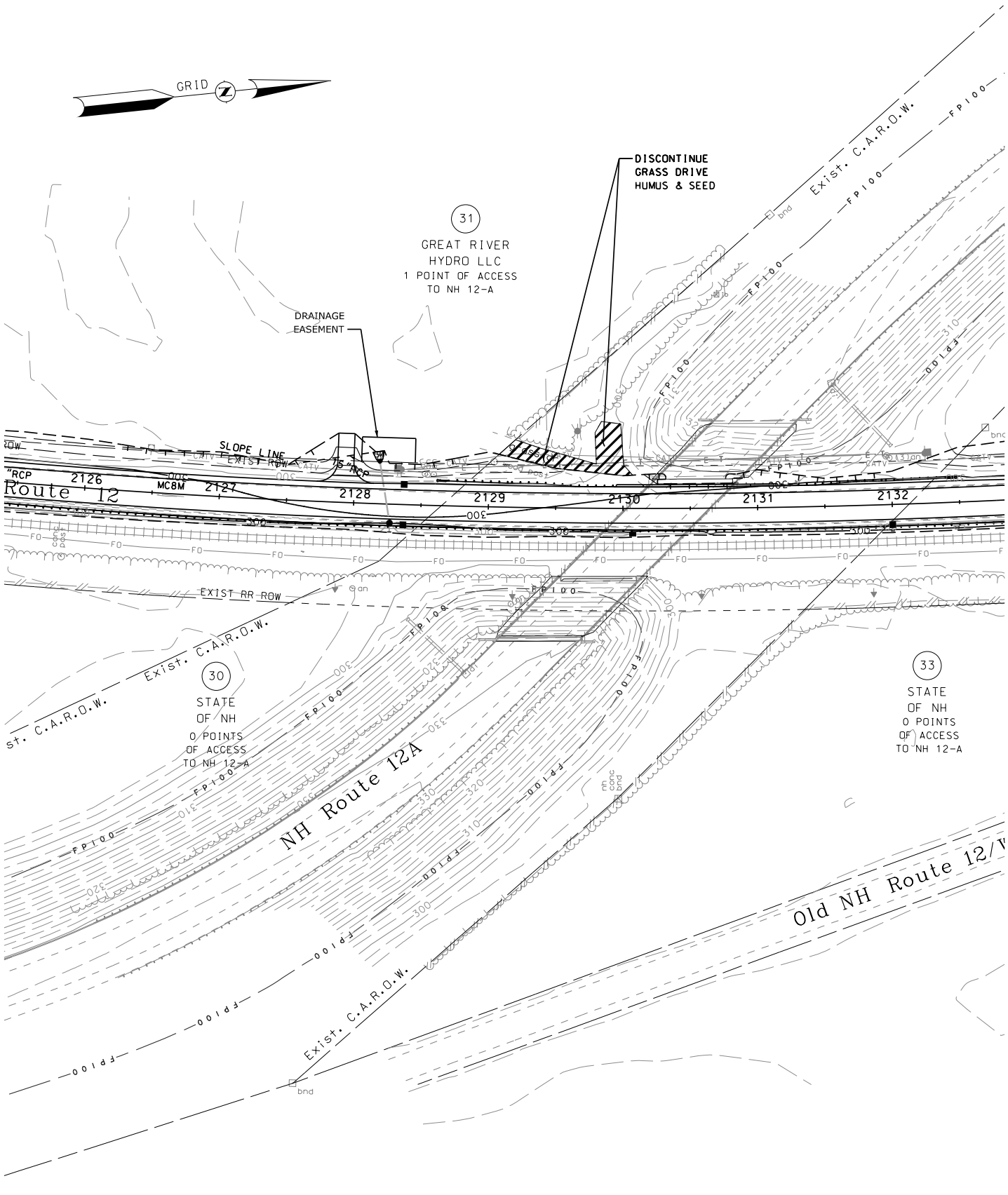
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE20	14747ACOEplans	14747	22	26



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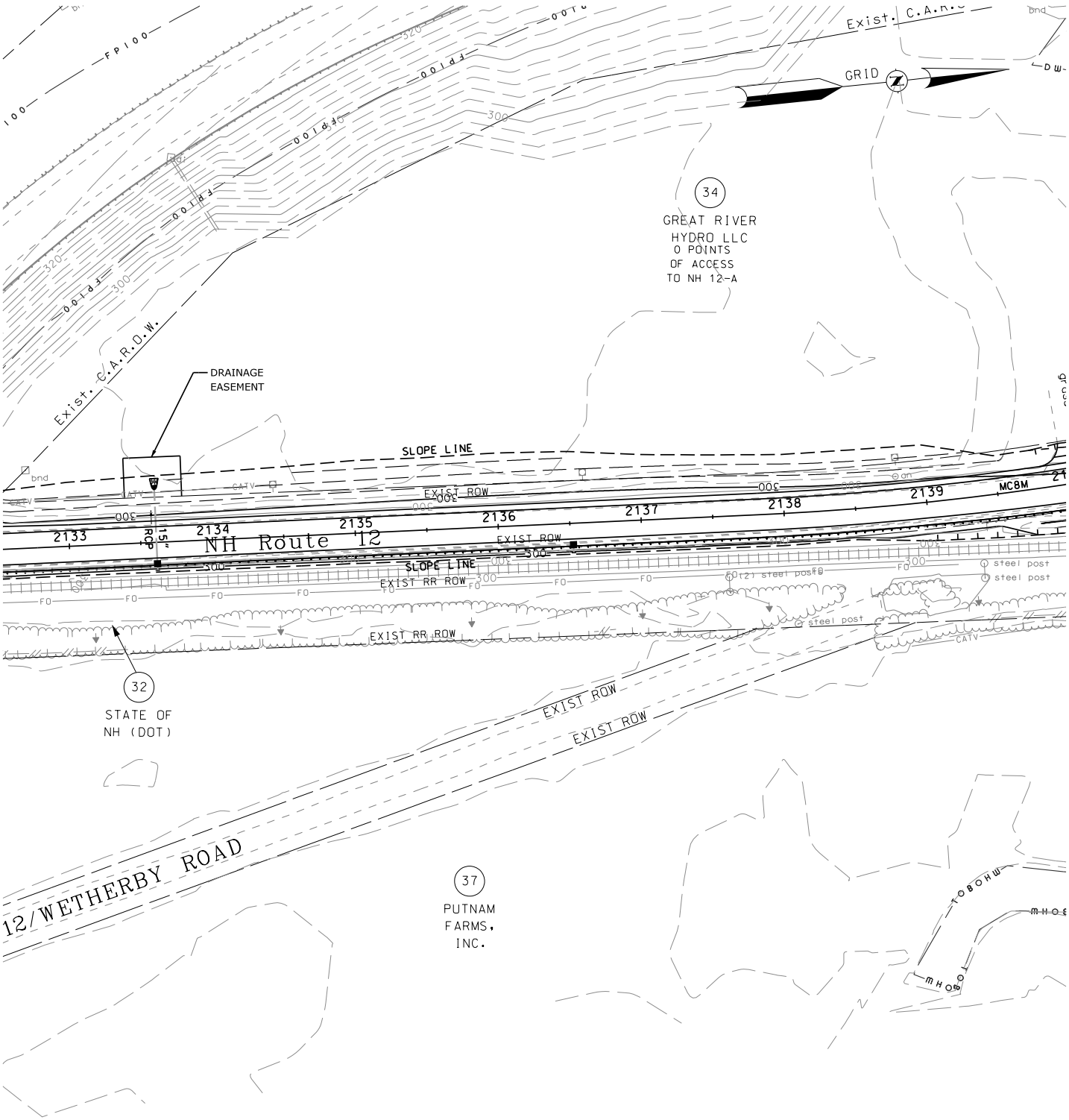
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE21	14747ACOEplans	14747	23	26



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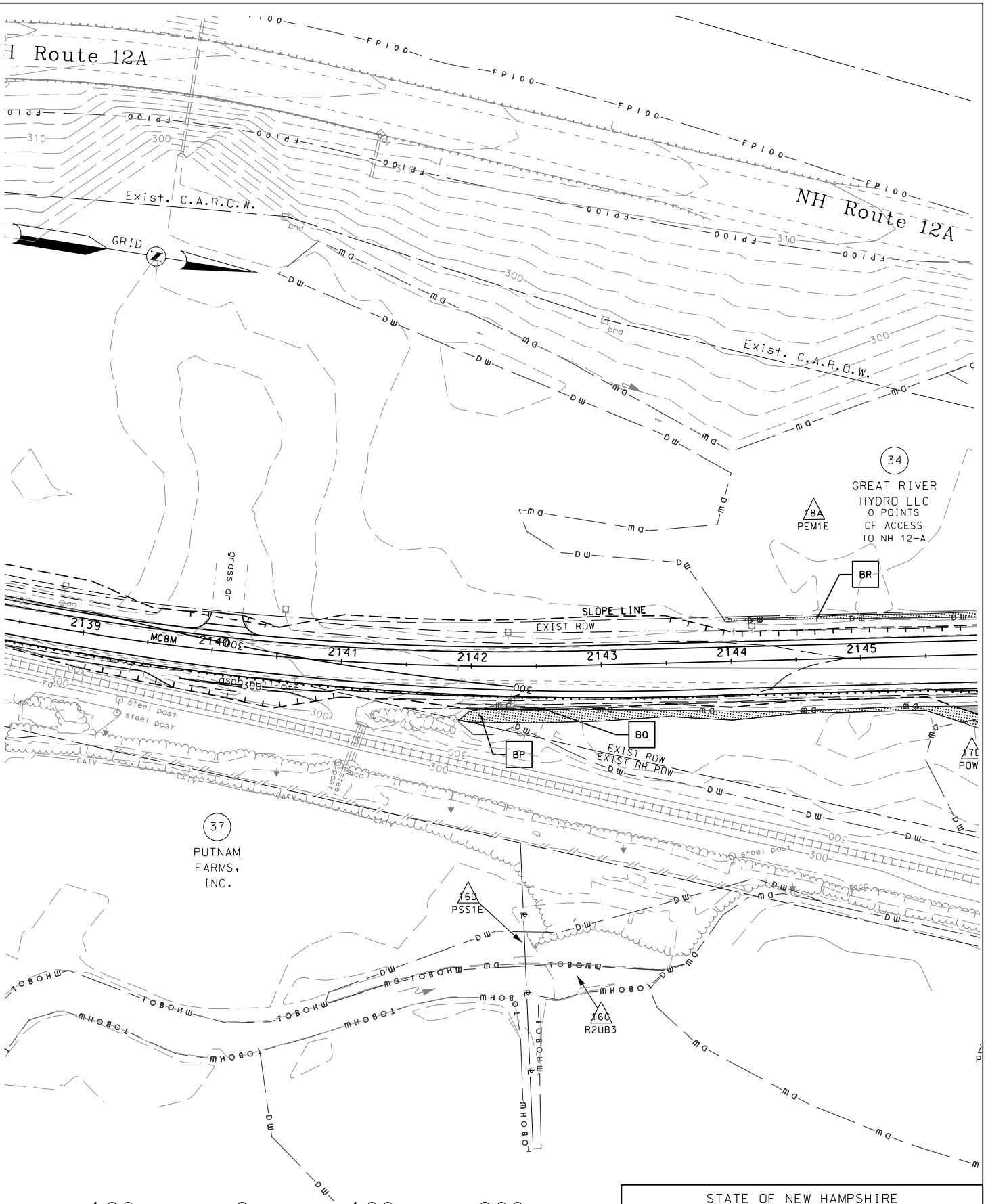
SCALE IN FEET

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE22	14747ACOEplans	14747	24	26



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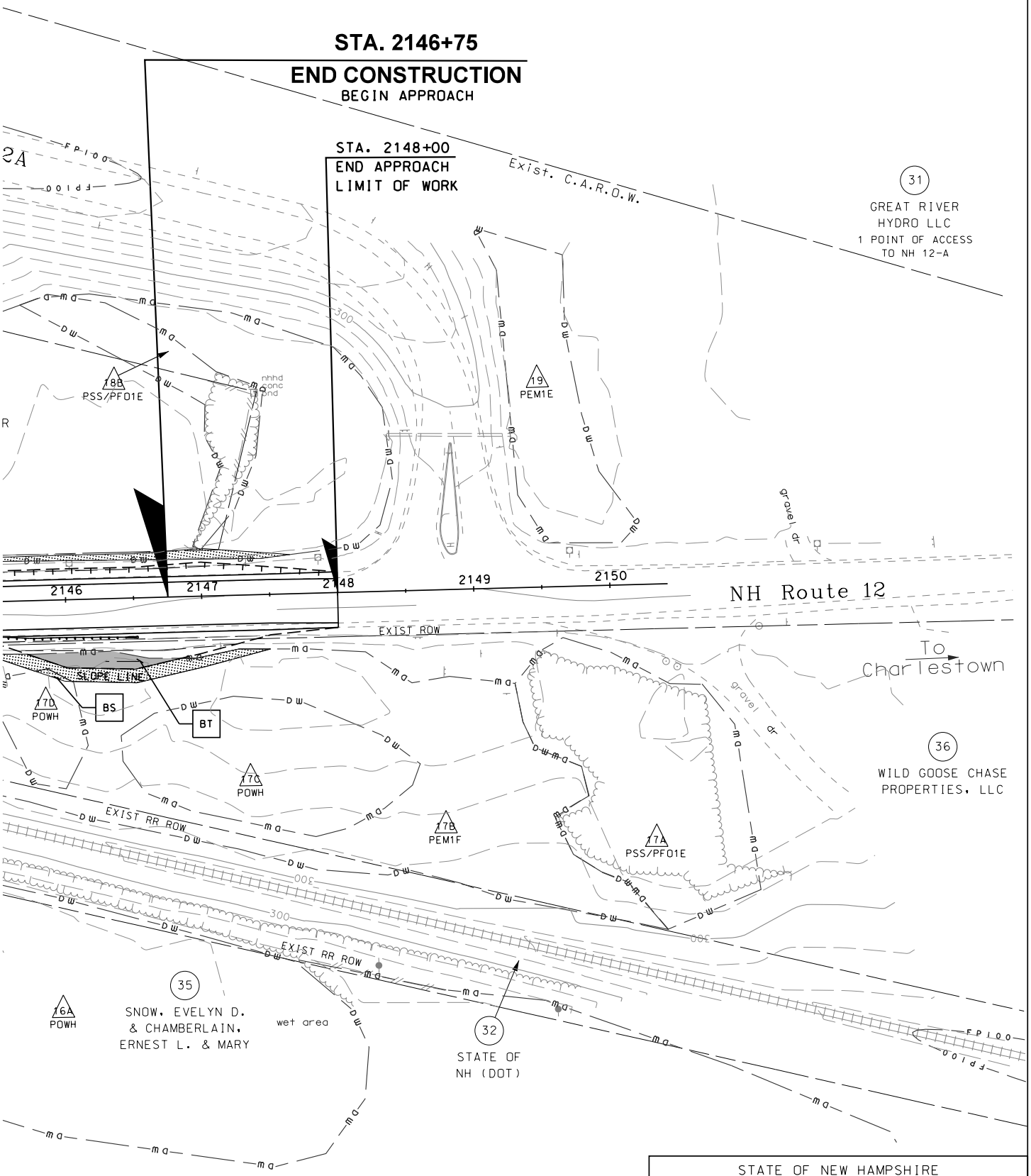
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN				
NH ROUTE 12 IMPROVEMENTS WALPOLE-CHARLESTOWN				
MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE23	14747ACOEplans	14747	25	26



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NH ROUTE 12 IMPROVEMENTS
WALPOLE-CHARLESTOWN

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
ACOE24	14747ACOEplans	14747	26	26